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## **Thematic Similarity and Managerial Decision Making**

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## **Extended Summary**

The present dissertation applies findings from the field of cognitive psychology to the business context. Specifically, it examines the influence of different types of similarity on decisions in the areas of innovation and strategy. Similarity and related concepts, such as strategic fit, play an important role in these fields, such as when generating or assessing the value of ideas. However, recent findings in cognitive psychology, indicating that a purely taxonomic, traditional model of similarity does not capture the entire picture of similarity, have widely been ignored in the business context.

Two entities are taxonomically similar if they belong to the same category based on features they share (e.g., dog and cat). In contrast, entities are thematically similar if they co-occur or interact in the same scenario or event (e.g., dog and bone). Thematic thinking builds on the latter type of similarity. The present dissertation focuses on the role thematic similarity plays in managerial decision making and takes the first steps toward establishing thematic thinking as a business-relevant concept, using a multi-study approach. After explaining the conceptual basis of thematic thinking, hypotheses are derived and tested, using four different samples of field data and applying different methods of data collection. The main body of the dissertation comprises four empirical studies.

The first study that is presented examines individual antecedents and outcomes of thematic thinking based on a sample using survey data from 199 individuals. Positive affect and experience are shown to be positively related to thematic thinking. A negative relationship is postulated for thematic thinking and formal education; the relationship found is indeed negative, yet not significant. The empirical findings related to the outcomes of thematic thinking turn out to be the opposite of the postulated relationships: creativity is found to be significantly negatively related to thematic thinking, while adaptation is significantly positively related to it.

The second empirical study investigates the relationship between thematic thinking and individual performance within the research and development (R&D) context. The findings are based on a sample of 172 R&D professionals. As hypothesized, a significant positive relationship between thematic thinking and innovativeness as well as job performance are shown. The relationship between thematic thinking and job performance is mediated by innovativeness. Furthermore, post-hoc analyses reveal that the relationship between thematic thinking and job performance is moderated by political skill.

The third empirical study examines thematic thinking at the idea level. A thematic perspective on idea evaluation within innovation suggestion systems is presented and empirically tested, using data from the internal idea suggestion system of a multinational manufacturer of consumer goods. In this study, 378 ideas and related evaluations were analyzed. The empirical results show that thematic ideas receive better evaluations than taxonomic ideas on all evaluation dimensions. The results show that idea character (“thematicness”) and idea presentation (“scenario” and “experiential proximity”) independently explain variance in idea evaluations.

The fourth and final empirical study examines thematic thinking on a strategic level. Investor reactions to merger and acquisition (M&A) deal announcements, conveying either a thematic or a taxonomic logic, are examined. Cumulative average abnormal returns are used to operationalize the reactions. As stated in the hypotheses, the results indicate that investors initially react negatively to thematic deal announcements, but react positively to taxonomic deal announcements. After a time lag, however, this gap vanishes, and no statistically significant difference is found.

The empirical findings of all the studies are discussed in a broader context, integrating them into one *thematic perspective*. Theoretical and managerial implications are provided, and limitations and avenues for future research are outlined.

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## Abbreviations and acronyms

b	Unstandardized regression coefficient
$\beta$	Standardized regression coefficient
CAR	Cumulative abnormal returns
CAAR	Cumulative average abnormal returns
CEO	Chief executive officer
e.g.	Exempli gratia (for example)
e-mail	Electronic mail
etc.	Et cetera (and so forth)
FFE	Fuzzy front-end
i.e.	Id est (that is)
KAI	Kirton adaption-innovation inventory
M&A	Mergers and acquisitions
N	Number of observations in the sample
p	Probability of obtaining test statistics at least as extreme as the one observed, assuming that the null hypothesis is true
r	Correlation coefficient
$R^2$	Coefficient of determination
R&D	Research and development
SAM	Self-assessment manikin
SD	Standard deviation
SE	Standard error
SIC	Standard industry classification
VIF	Variance inflation factor

# **1 Introduction**

## **1.1. Relevance and scope of thesis**

Similarity is fundamental to cognition. It influences a wide range of cognitive processes, such as perception, recognition, knowledge representation, creativity, categorization, and reasoning (Ashby & Perrin, 1988; Gentner & Markman, 1997; Goldenberg & Mazursky, 1999; Hampton, 1988; Hampton, 1998; Ordoobadi, Xue, & Shanteau, 2005; Saalbach & Imai, 2007). These cognitive processes are of great importance to managerial cognition, and hence, for decision making in a wide range of business areas, including marketing (e.g., Bijmolt, Wedel, Pieters, & DeSarbo, 1998; Hem & Iversen, 2002; Markman & Loewenstein, 2010), innovation (e.g., Goldenberg, Mazursky, Horowitz, & Levav, 2003; Seshadri & Shapira, 2003), and strategy (e.g., Deephouse, 1999; Farjoun & Lai, 1997). To give just a few examples, brand extensions are posited to be more successful when they are similar to existing products (Aaker & Keller, 1990); ideas are often generated based on a combination of similar entities (Goldenberg, Mazursky, & Solomon, 1999; Seshadri & Shapira, 2003); strategic decisions are made based on similarity of contexts and organizations (Deephouse, 1999; Farjoun & Lai, 1997); and opportunities are recognized based on similarity perception (Grégoire, Barr, & Shepherd, 2010).

The importance of similarity in managerial decisions is evident; however, hardly any research has been conducted about the nature of similarity itself. Recent research from other disciplines shows that similarity perception is driven not only by taxonomic similarity, but also by thematic similarity (Golonka & Estes, 2009; Lin & Murphy, 2001; Saalbach & Imai, 2007). These findings are applied in the present dissertation, not only by examining the role of similarity in managerial decision making, but also by focusing on the interplay of taxonomic and thematic similarity in the business context.

Conventionally, two entities are regarded as similar if they possess the same features (e.g. Gati & Tversky, 1984; Tversky, 1977). Following this logic, a dog is similar to a cat because both are pets, have four legs, and are furry (Estes, Golonka, & Jones, 2011). This type of similarity is called taxonomic similarity. Recent research shows that taxonomic similarity is not the only source of perceived similarity. Golonka and Estes (2009) found that thematic similarity increases perceived similarity. Consequently, a two-process model of similarity perception has been proposed in recent research studies (Estes, 2003; Simmons &

Estes, 2008; Wisniewski & Bassok, 1999). In this model, the perception of similarity is determined not only by commonalities, but also by thematic relations. Based on this assumption, milk and coffee are rated as more similar than coffee and lemonade, because besides their commonalities (both are liquids and drinkable), they are thematically related (Estes et al., 2011). Thematic relations are defined as “the external or complementary relations among objects, events, people, and other entities that co-occur or interact together in space and time” (Lin & Murphy, 2001: 3); i.e., are related via a theme. Accordingly, a theme can be defined as a conceivable idea that unifies two or more entities. In the example mentioned above, milk and coffee are these entities that are externally related by the theme “having a coffee”. Other entities belonging to this theme could be coffee cup and sugar.

Cyert and March (1963) were the first to postulate bounded rationality of managers. As a result of bounded rationality, managers develop subjective interpretations of their environment, which guide their subsequent strategic decisions (Nadkarni & Barr, 2008). The tendency to use either thematic or taxonomic thinking could influence the shape of a manager’s subjective representation of the world, which is the basis for every decision he or she makes. Hence, the tendency to base cognitive operations on either taxonomic or thematic similarity should have an influence on managerial decision making. The present dissertation sets out to apply this perspective on managerial decision making to similarity decisions in the fields of innovation and strategy.

This focus was chosen for several reasons. Innovation is a crucial part of a firm’s strategy, offering multiple opportunities to apply thematic similarity. The product idea itself is an important antecedent of new product success (Cooper, 1996). Thematic thinking can help to generate and identify promising and original ideas that might not have been revealed by using a solely taxonomic perspective. Beyond idea generation, similarity decisions are also important for the subsequent steps in the innovation process. As such, “fit,” which is closely related to similarity, has to be assessed when decisions about the further development of an idea have to be made (Reid & De Brentani, 2004). Thematic thinking could also be important for recognizing opportunities and threats. Grégoire, Barr, & Shepherd (2010), for instance, found that similarity is an important driver of the underlying cognitive processes of recognizing innovation opportunities.

In the field of strategy, different streams of literature based on similarity already exist, especially in the field of strategic relatedness (e.g., Barney, 1988; D'Aveni, Ravenscraft, &

Anderson, 2004; Harrison, Hitt, Hoskisson, & Ireland, 1991; Makri, Hitt, & Lane, 2009). Farjoun and Lai (1997) emphasized the importance of correct similarity assessments for strategic decision making. They disclosed managerial traps that can be avoided by making the right similarity assessment. Yet, they define similarity in terms of taxonomic similarity only; thematic similarity is ignored. Competitor definition is another related field of strategy research where similarity perception is important. Strategists define competitors based on similarity of firms and use similarity to categorize competitors into strategic groups (Porac & Thomas, 1990; Porac, Thomas, & Baden-Fuller, 1989; Porac, Thomas, Wilson, Paton, & Kanfer, 1995; Reger & Huff, 1993). Again, similarity is defined in terms of taxonomies (see Porac & Thomas, 1990). Organizing knowledge in taxonomies and using these taxonomies as the basis for decisions makes a lot of sense. Taxonomies are parsimonious, they help to apply information to unknown objects, and they can be used to make reasonable decisions within the business context (Estes, Gibbert, Guest, & Mazursky, 2012; Estes et al., 2011; Porac & Thomas, 1990). For example, merging companies that are taxonomically similar (i.e., related in a traditional sense) leads to economies of scale and scope, which is a core goal of M&A (Harrison et al., 1991; Hitt et al., 2009). However, despite the advantages of taxonomic similarity, relying solely on a taxonomic logic prevents managers from seeing the entire picture of risks and opportunities (Gibbert & Hoegl, 2011). There is consensus regarding the assumption that managerial cognition, and therefore, the processing of similarity, is fundamental in managerial decision processes. Thus, these processes should be examined in light of the newly discovered approaches to similarity involving thematic similarity; otherwise, a blind spot will remain, which can be illuminated by applying a more comprehensive concept of similarity perception.

The present dissertation offers a new perspective on similarity in the business context, which will enable the deriving of important practical implications. Thematic similarity—and based on that, thematic thinking—could valuably supplement the purely taxonomic perspective. Including the thematic thinking perspective should help to see the full picture, and by doing so, help to generate new ideas, while at the same time avoiding false negatives in terms of opportunities as well as threats. By introducing thematic similarity as a supplement to taxonomic similarity—i.e., thematic thinking—additional strategic options can be identified. In terms of opportunity search, thematic thinking, for instance, could help to disclose opportunities that are taxonomically distant, yet similar in a thematic sense (Gibbert & Hoegl, 2011). This distant-yet-close-approach could be useful to scholars, as well as to

practitioners. The nature of similarity itself has scarcely been subject to business-related research, even though it has been examined thoroughly in cognitive psychology and is regarded as basal for many managerial decision processes. The present dissertation builds on different fields of research, including cognitive psychology, managerial cognition, innovation, strategy, and marketing.

## **1.2. Definition of key concepts**

In the following section, the key concepts of the present dissertation are described and defined.

### **1.2.1. Types of similarity**

The core elements of thematic similarity are *externality* and *complementarity* (Estes et al., 2011). Hence, two things are thematically similar if they are externally related and they complement each other by fulfilling different roles within a theme. In contrast to thematically similar entities, taxonomically similar entities tend *not* to complement each other (Estes et al., 2011). Instead, two things that belong to the same category share the same features and attributes. This fact constrains the possibilities of taxonomically similar entities to complement each other. Nails and screws share a fair amount of features and can be regarded as taxonomically similar (Estes et al., 2011). At the same time, the possibilities of being externally related are constrained due to the shared features. In contrast, a hammer and a nail are taxonomically dissimilar, but they are related via a hammering theme, which can be realized only because of their different characteristics (a hammer being flat and heavy, and the nail being small and sharp) (Estes et al., 2011). The fact that thematically similar entities take on different roles in a theme results in these entities tending to be dissimilar in regard to their features (Estes & Jones, 2009; Golonka & Estes, 2009; Lin & Murphy, 2001; Wilkenfeld & Ward, 2001; Wisniewski, 1996; Wisniewski & Bassok, 1999; Wisniewski & Love, 1998). In parts of the management literature, complementarity is used synonymously with fit or congruence (Ennen & Richter, 2010), which highlights the dilemma when looking for *new* complementarities: by definition, things that can complement each other are *not* taxonomically similar; i.e., they do not obviously belong to the same category.

Throughout the present dissertation, *thematic similarity* is defined as two entities being similar based on being externally related by performing complementary roles within the same scenario or event; i.e., being causally, functionally, spatially, or temporarily related

within a theme (Estes et al., 2011; Golonka & Estes, 2009; Lin & Murphy, 2001; Wisniewski & Bassok, 1999). *Taxonomic similarity* is defined as two or more entities belonging to the same category based on sharing internal features (Estes et al., 2011; Markman & Wisniewski, 1997; Rosch, 1975).

*Thematic thinking* is defined as cognitive processes and their outcomes that are based on thematic similarity, including inter-individual differences in similarity preferences and ideas that are based on a combination of thematically similar entities. Along these lines, *taxonomic thinking* is defined as cognitive processes and their outcomes that are based on taxonomic similarity, including inter-individual differences in similarity preferences and ideas that are based on a combination of taxonomically similar entities. Furthermore, *thematic* and *taxonomic logic* are defined as assumptions based on either thematic or taxonomic similarity of entities.

### **1.2.2. Themes**

While other constructs related to thematic similarity have at least been defined, what constitutes a “theme” has only been addressed indirectly, even in cognition research on thematic similarity. This provides a theoretical motivation to identify the correct themes as the most important first step when applying these cognitive insights to managerial practice.

A theme unifies two or more entities. In the definition of thematic similarity by Estes et al. (2011), one important aspect is that the entities in question are related via a scenario or an event. Scenarios contain typical characters with their typical characteristics and related typical sequences of actions, and they are based on scripts (Schank & Abelson, 1977). Scripts specify sequences of behavior or events that are appropriate in a given situation (Gioia & Poole, 1984). Having dinner in a restaurant is a typical scenario that also can be regarded as a theme. It unifies entities such as waiter, food, and table, and contains a typical sequence of actions (e.g., the guest pays the bill after the meal). Hence, the listed entities can be regarded as thematically related. In the present dissertation, *themes* are defined as conceivable ideas that unify two or more entities.

### **1.2.3. Association**

Basically, concepts are associated if one evokes thoughts of the other (Estes et al., 2011). Association strength is mostly defined operationally by the free association probability; i.e., the likelihood that a person will produce a certain word as reaction to a cue

word. Thematic thinking goes beyond mere association. Entities that are associated are not necessarily thematically related, and there are thematically related concepts that are not associated (Estes & Jones, 2009; Simmons & Estes, 2008). “Milk” and “cat,” for example, are unassociated, yet thematically related (Estes et al., 2011). This independence of thematic relatedness could be of great interest in innovation contexts, because it could be used to identify ideas that otherwise might have been missed out on because they lack association.

At first sight, association is more an antecedent of an idea than its outcome. However, if the constituent parts of a thematic idea have not been associated before and the new thematic idea is successful, this should lead to the association of these concepts. This increase in association strength is most probably limited to the target group. Specific groups of customers will show different association patterns than the entire population. For example, providing an innovation that is specific to a certain context, such as jogging, will affect the association strength of the idea’s elements in the jogging population, but it is less likely to affect overall association strengths.

### **1.3. Research gap and contributions**

As illustrated above, although similarity plays an important role in the business context, research in the field of thematic similarity is virtually non-existent in the business context. The few publications that contribute to developing thematic thinking as a managerial concept have failed, so far, to draw a holistic picture (i.e. Estes et al., 2012; Gibbert & Hoegl, 2011). The present dissertation contributes by drawing a more holistic picture of thematic thinking and further establishing the concept in management research. The dissertation is based on conceptual considerations and empirical analyses. The conceptual considerations draw on different streams of literature, yet mainly focus on applying insights from cognition research on similarity decisions to managerial decision making. Furthermore, several empirical investigations focusing on different levels of analysis shed light on the relationships of thematic thinking with other relevant concepts.

The main goal of the present dissertation is to provide a conceptual and empirical basis for establishing thematic thinking in the business context. In line with this goal and due to the lack of research on this topic, the research questions of the thesis are fundamental in nature. They do not address specific gaps in the theoretical and empirical foundation of thematic thinking, but rather, they address the concept as a whole.



Based on these considerations, the present dissertation intends to answer the following research questions:

- How can thematic thinking be conceptualized in the business context?
- What are the antecedents and outcomes of thematic thinking?
- How does thematic thinking affect business practice?

Figure 1-1 illustrates the research gaps and questions addressed in the present dissertation.

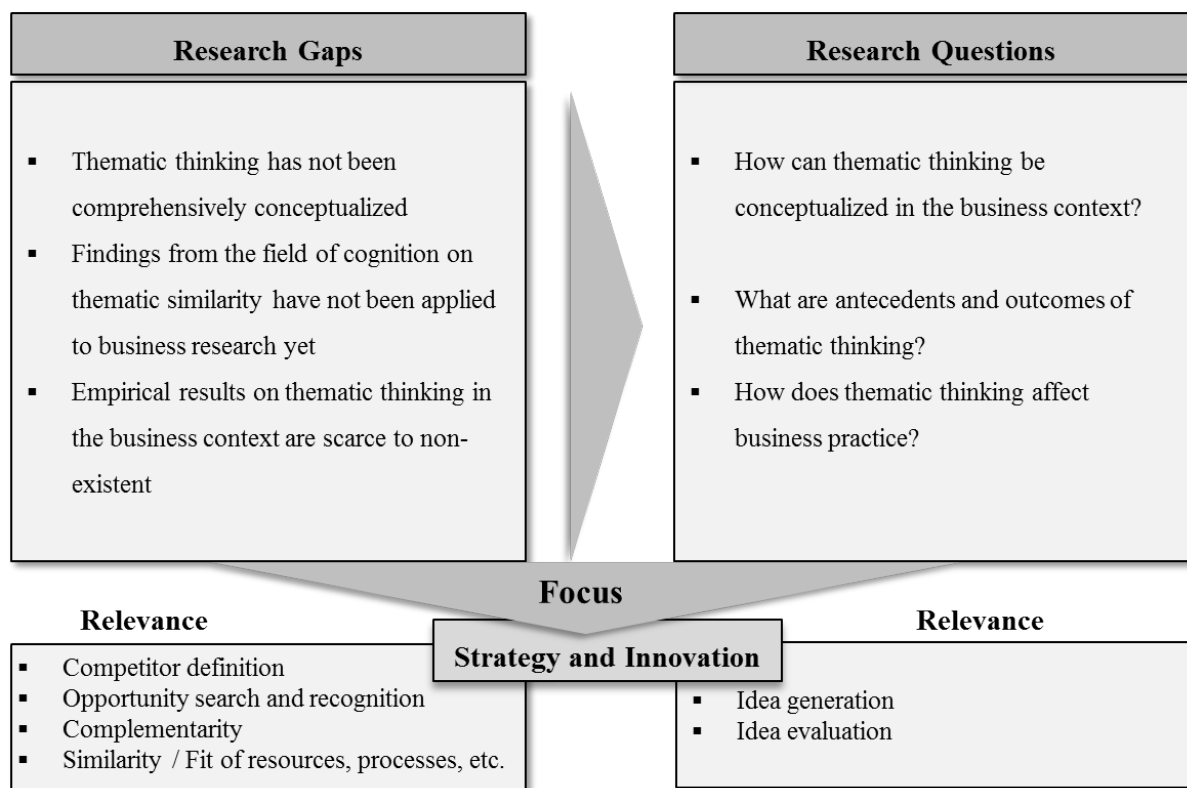


Figure 1-1: Overview of the research framework of the dissertation.

### 1.3.1. Conceptualization and measurement of thematic thinking

Despite its decades-long existence within cognition literature, the conceptualization of thematic thinking is still vastly incomplete. Estes, Golonka, and Jones (2011) took important steps in the conceptualization, and their review provides a comprehensive overview of the state of the literature on thematic thinking in the field of cognition. By doing so, they took the important first steps toward understanding thematic thinking as a multi-faceted concept.

However, they are missing important links necessary to apply the concept successfully to the business context.

As stated above, thematic thinking is defined as cognitive processes and their outcomes that are based on thematic similarity. This definition underlines that there are different perspectives to thematic thinking that will have to be taken into account. First, the cognitive processes underlying thematic thinking—i.e., similarity perception—need to be put conceptually into a business context. However, thus far, studies have focused on a more general cognitive context. The present dissertation contributes to the conceptualization of thematic thinking in two ways. First, thematic thinking is placed in the context of different research streams and management theories; it is integrated with Nonaka's dynamic theory of organizational knowledge creation (Nonaka, 1994) and the view of organizations as interpretation systems (Daft & Weick, 1984).

Second, thematic thinking is linked with concepts and variables that are of relevance in management research by empirically investigating these links. Hence, the empirical investigations contained in this dissertation contribute by establishing links with relevant concepts, and taken together, contribute by drawing a more comprehensive picture of thematic thinking. To conduct these studies, and in order to further establish thematic thinking in the business literature, an adequate measure is needed. The present dissertation uses several measures for thematic thinking an “thematicness” respectively. The studies presented in Chapters 3 and 4 measure thematic thinking at the individual level. Both use a refined version of the forced choice word triad test used in prior studies by Simmons and Estes (Simmons & Estes, 2008) and Lin and Murphy (Lin & Murphy, 2001). In Chapter 2, a pretest is presented that was used to develop the measure as it was used in the present dissertation. The studies presented in Chapters 5 and 6 examine reactions to thematic ideas. Here, “thematicness” is measured at the idea level. Coding techniques based on a pre-study, presented in Chapter 2, were used for these studies.

### **1.3.2. Antecedents and outcomes of thematic thinking**

Some general studies have examined antecedents of thematic thinking, such as need for cognition (Simmons & Estes, 2008) or age (Smiley & Brown, 1979). However, these advances can only explain a small part of the phenomenon of thematic thinking, and they were mainly derived using experimental settings with undergraduate students as study subjects. To place thematic thinking in the business context, a more comprehensive

understanding of antecedents and outcomes is needed. Furthermore, different levels of analysis and different settings should be taken into account in order to triangulate findings.

Estes and colleagues (2011) summarized several studies from the field of cognition research indicating (stable) inter-individual differences in thematic thinking (see Dunham & Dunham, 1995; Golonka & Estes, 2009; Lin & Murphy, 2001; Murphy, 2001; Simmons & Estes, 2008; Smiley & Brown, 1979; Waxman & Namy, 1997). The present doctoral thesis builds on these studies by applying the findings to samples derived from the working population examining antecedents, as well as outcomes of inter-individual differences in thematic thinking. Two individual level studies were conducted (presented in Chapters 3 and 4). The first study focuses on general insights on the individual level antecedents and outcomes of thematic thinking, and the second study builds on these findings and uses field data to examine the thematic thinking-performance relationship.

To my knowledge, the paper by Estes et al. (2012) is the first and only published paper explicitly examining the outcomes of thematic thinking within the business context. The study shows that thematic brand extensions lead to different reactions than taxonomic brand extensions do, and that these evaluations depend not only on the idea itself, but also on the judgment context (Estes et al., 2012). This study significantly advances research on thematic thinking by examining the outcomes of thematic thinking in terms of reactions to thematic ideas. However, the findings are limited to the field of brand extensions. The present dissertation contributes to this line of research on reactions to thematic ideas with two independent empirical studies, using field data derived in two different contexts (presented in Chapters 5 and 6). Building on the findings of the study presented in Chapter 4, which was conducted at an individual level in the R&D context, the study presented in Chapter 5 examines the evaluation of thematic ideas in the R&D context. To complement and triangulate these findings, the study presented in Chapter 6 examines outcomes of thematic thinking in the context of M&A deals.

### **1.3.3. Relevance of thematic thinking in the business context**

Literature on thematic thinking is mainly prevalent in the field of cognition. Therefore, it does not come as a surprise that these studies contain hardly any evidence of the relevance that thematic thinking actually has in the business context. Gibbert and Hoegl (2011) argued that thematic thinking and receptiveness to thematic similarity in particular, are important in order to “see the bigger picture.” Along these lines, attending to a purely

taxonomic logic can be dangerous, as valuable thematic opportunities can be missed. Furthermore, not taking thematic options into account when making decisions, can pose threats to firms. This present dissertation builds on this line of argument and seeks to provide conceptual and empirical evidence of the relevance of thematic thinking in the business context.

In order to establish thematic thinking in the context of management research, its relevance has to be demonstrated. The way the present dissertation contributes to this research gap is two-fold. First, the link between thematic thinking and performance is established by illuminating it in different contexts. Thematic thinking is linked, conceptually and empirically, to individual performance (Chapter 4). Furthermore, by building directly on the findings of Estes and colleagues (2012), the dissertation shows how thematic ideas perform in different contexts (Chapters 5 and 6).

Second, thematic similarity is conceptually integrated with complementarity, which plays an important role in business practice and research (Ennen & Richter, 2010). The theoretical integration of both concepts contributes by demonstrating the relevance of thematic similarity, and hence, thematic thinking in the business context. It also contributes to complementarity research by disentangling its antecedents. The framing of thematic thinking as an antecedent of complementarity focuses on the under-researched field of demand-side complementarities. “Other products,” which are products from dissimilar categories that are, nevertheless, thematically similar, are relevant to the demand for the product at hand (Shocker, Bayus, & Kim, 2004). Therefore, if the aim is to increase demand, understanding which other products belong to the relevant set is highly important. The crux of the matter is that “other products,” or in a more general sense, “other entities” are difficult to identify, as the solution space is infinite, especially when the products are neither taxonomically similar nor part of an existing complementarity relationship. The outcomes of complementarity have been extensively researched (e.g., Chernev, 2005; Ennen & Richter, 2010; Parmigiani & Mitchell, 2009; Song, Droge, Hanvanich, & Calantone, 2005). For instance, prior research has identified different types of complementarities (e.g., complementary assets versus complementary products; Chernev, 2005; Feldman, 1994; Hess & Rothaermel, 2011; Sengupta, 1998), linking them to positive and negative effects on the product, firm, and corporate level (Ennen & Richter, 2010). At the same time, remarkably little is known about where these complementarities come from in the first place (Ennen & Richter, 2010). As Ennen and Richter (2010: 208) concluded, the body of prior research on complementarities

“offers little prediction regarding the conditions under which complementarities are likely to emerge or on the nature of the elements or factors (e.g., organizational characteristics) among which complementarities exist.”

#### **1.4. Outline of thesis**

The present dissertation takes a multi-faceted perspective on thematic thinking. Thematic thinking is conceptualized, and hypotheses are derived from existing theory and tested empirically in a multi-study design. Chapter 2 provides an overview of the samples and methods used for the empirical studies, which build the basis for the main part of the present thesis. Hypotheses for the individual studies are derived and tested, and the results are presented and discussed in Chapters 3–6.

In Chapter 3, individual level antecedents and outcomes of thematic thinking are examined. The antecedents and outcomes tested are derived theoretically from the literature, and they are tested empirically using a sample of individuals working in a wide range of professions. Specifically, experience, formal education, and positive affect are examined as antecedents and creativity, and adaptations are examined as outcomes.

Chapter 4 draws on the results of Chapter 3 by examining individual level outcomes in the specific context of R&D. In contrast to Chapter 3, a more homogenous sample of individuals is chosen to develop a model of the mechanisms that translate thematic thinking into individual job performance and innovativeness.

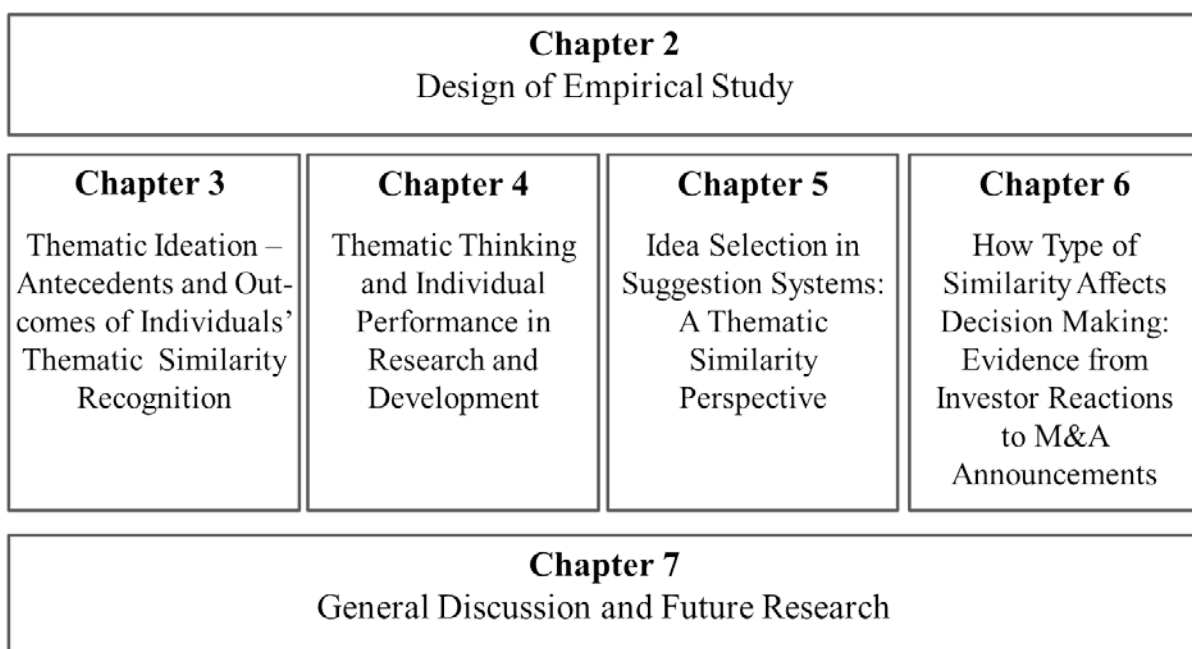
Chapter 5 takes the findings of Chapters 3 and 4 to the next level. While the individual perspective is examined in the previous chapters, Chapter 5 examines how thematic ideas are *evaluated* in the business context. A thematic perspective is presented on idea evaluation comprising the factors idea character (“thematicness”) and idea presentation (“scenario” and “experiential proximity”). Hypotheses are derived from theory and tested empirically by examining ideas and the related evaluations taken from the internal innovation suggestion system of a multinational manufacturer of consumer goods.

Chapter 6 illustrates how different types of similarity influence decisions in the context of investor reactions to M&A announcements. Contrary to the argumentation in Chapter 5 that thematic ideas are favorable within the context of innovation suggestion systems, it is argued that in the context of M&A announcing a deal following a thematic logic will initially lead to more negative investor reactions than will communicating a taxonomic

logic. Further, it is argued that when more information becomes available, or when the information at hand is analyzed more deeply, the evaluation is revised and investors react more positively than before to thematic deals. Over time, this leads to an approximation of the evaluations for thematic and taxonomic deals.

Chapters 3–6 are organized and presented as individual empirical papers, with their own abstract, introduction, theory, hypotheses development, methods, results, and discussion sections. Efforts were made to reduce redundancies based on this type of structure; however, at some points, it was not entirely possible to avoid them.

The general discussion is presented in Chapter 7. The empirical findings of Chapters 3–6 are summarized and discussed in regard to their theoretical implications. Furthermore, practical implications are presented that focus on concrete ways to develop thematic ideas, and as such, foster thematic thinking in business practice. This section is followed by a section on the dissertation’s limitations and avenues for future research. The thesis closes with a conclusion. An outline of the structure of the thesis is presented in Figure 1-2.



*Figure 1-2: Overview of the structure of the thesis.*

## **2 Design of empirical study**

As the present dissertation aims at answering research questions in a vastly unexplored field, an empirical approach that applies a multi-study and multi-method design was chosen (Campbell & Fiske, 1959; Jick, 1979; Rossman & Wilson, 1985). This approach enables a triangulation of the findings of the individual studies, and as such, fosters a better understanding of thematic thinking as a multi-layered concept (Collins, Onwuegbuzie, & Sutton, 2006; Greene, Caracelli, & Graham, 1989).

### **2.1. Pre-studies**

Empirical studies and conceptual work on thematic thinking in the business context are very scarce and incomplete. Hence, not only is conceptual clarity missing, but adequate measures as well. Therefore, several pre-studies were conducted, to ensure a high level of research quality for the main study of the dissertation. The studies served to gain a better understanding of the concept of thematic thinking and to advance the methods that measure thematic thinking. The findings of the present chapter serve as the basis for the measurement of thematic thinking in Chapters 3–6.

#### **2.1.1. Analysis of idea competition**

As a first explorative attempt to capture how ideas can be classified as thematic, 73 new product ideas that student groups had generated in an idea competition were analyzed. Related evaluations by managers of the organizing firm were also included in this exploratory research. The participating teams whose ideas were evaluated were of 11 different nationalities. Their ideas were rated by 53 evaluators, each of whom reviewed four to 13 ideas. The primary sample contained 83 ideas from all of the national finalists in this international competition, which was sponsored by a large German manufacturer of consumer goods. Ten ideas had to be eliminated because either a description of the idea (standardized application form, completed by every participating team) or the respective evaluations were missing. The task given to the participants was to develop new product ideas for the year 2050, taking into account the megatrends that will influence life in the next 40 years.

For example, several teams produced ideas that involved doing laundry without water. In a “laundering” theme, water is one of the central aspects, which gives an eminently fanciful appeal to ideas that exclude this aspect. In the terminology of the present dissertation, such a product idea is classified as using the external operator of exclusion, as water is

excluded from the theme (see also Chapter 7). The insights gained from the analysis of these ideas helped to develop the coding systems used for the empirical studies presented in Chapters 5 and 6.

### **2.1.2. Development of triad test**

Studies in the field of cognitive psychology dealing with thematic thinking use forced-choice word triads to assess individuals' preference for thematic similarity (Lin & Murphy, 2001; Simmons & Estes, 2008). A pre-study using a student sample was conducted in order to gather experience in conducting this type of test, as well as to refine the published items and to gain exploratory insights into the relationships between thematic thinking and other individual level constructs.

The study investigated the effects of item construction in terms of the effects of association and exact wording of the test instructions on testing thematic thinking. As argued above, association and thematic similarity are not identical; therefore, items should be constructed in a way that inhibits confounding effects of association and thematic similarity. Furthermore, prior research has shown different results for different types of similarity tasks (Golonka & Estes, 2009; Lin & Murphy, 2001); hence, the exact wording of the task is likely to influence the answers of the participants. Therefore, the following hypotheses were tested:

*Hypothesis 1: The wording of the instructions influences the proportion of thematic options chosen.*

*Hypothesis 2: Association strength between concepts influences the proportion of thematic options chosen.*

**Method.** Thematic thinking was measured using word triads, according to the procedures used by Simmons and Estes (2008). Each triad consisted of a base (e.g., chalk), a taxonomically related option (e.g., marker), and a thematically related option (e.g., blackboard). Overall, 40 triads were presented. Twenty of the triads were selected from the items used by Lin and Murphy (2001), and the remaining 20 items were developed for the study with the thematic option and the taxonomic option being equally strongly associated with the base item. Information about the strength of the associations—defined as free association probability—was collected from a database provided by the University of Florida (Nelson, McEvoy, & Schreiber, 2004).



To gather, in an explorative manner, information on the relation between thematic thinking and personality traits, a very brief measure of the Big Five was included in the questionnaire. The TIPI-G (Gosling, Rentfrow, & Swann, 2003) measures each dimension of the Big Five (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) with two items each. The items are formulated as self-descriptive adjectives (e.g., extraverted, enthusiastic). Each item was rated using a seven-point Likert scale (1 = disagree strongly; 2 = disagree moderately; 3 = disagree a little; 4 = neither agree nor disagree; 5 = agree a little; 6 = agree moderately; 7 = strongly agree).

An adaptation of the *Kirton adaption-innovation inventory* (KAI) (Kirton, 1976) was used as an approximation of creativity. Each item was rated on a seven-point Likert scale. The anchors of the scale were the same as in the personality inventory used.

Research has shown that mood affects a wide range of cognitive processes, including categorization (Isen & Daubman, 1984; Isen, Daubman, & Nowicki, 1987). Due to these findings, as well as the fact that the antecedents of thematic thinking are widely unexplored, a brief measure for mood was implemented in the questionnaire. The adapted version of the *self-assessment manikin* (SAM) by Lang (1980) was used. Participants were asked to choose the manikin that reflected best their current affective state (“Please select the manikin which reflects best your present emotions”). Three different dimensions of emotions were measured: valence, arousal, and dominance. The scales are shown in Figure 2-1.

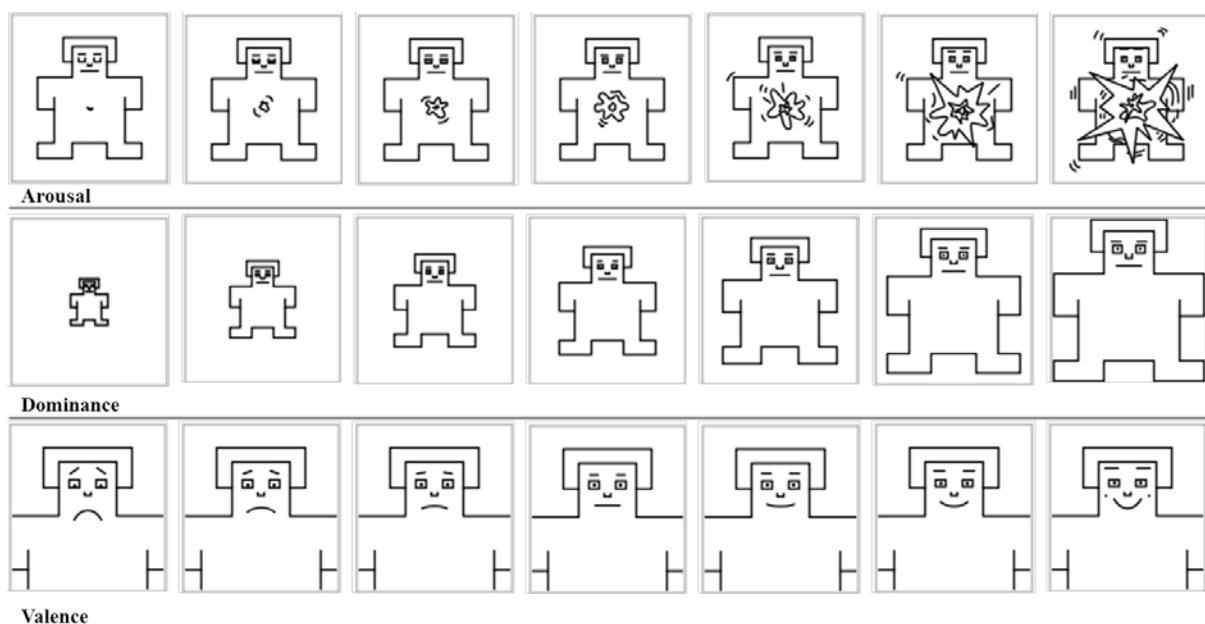


Figure 2-1: Scales of the Self-Assessment Manikin.

In addition, demographic variables, including age, gender, and nationality of the study participants were collected.

**Participants and procedures.** The study was conducted as a class experiment, with 61 students participating. The average age of the students was 21.54 years; the youngest participant was 20 years old, and the oldest was 24. The study was conducted in a German business school, and 68.9% of the participants were German. In addition, 36.1% of the participants were female. Each student received the material, consisting of the instructions, two answer sheets for answering the word triads, and a questionnaire containing the scales mentioned above. A timed presentation with a word triad on each slide was shown, as a prior pretest showed that without time constraints, all participants chose either only the taxonomic options or only the thematic options, with nearly all participants choosing the thematic options. An example triad is shown in Figure 2-2.

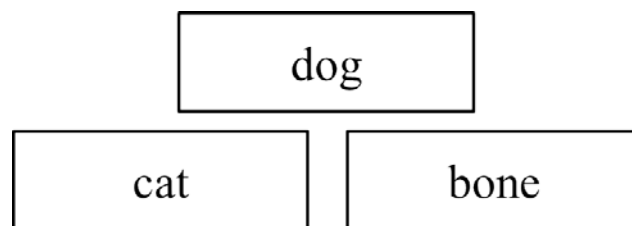


Figure 2-2: Example word triad.

The participants were randomly assigned to two conditions. One group was asked in the instructions to “decide which of the concepts shown below the target concept *goes best* with the target,” while the other group was asked to “decide which of the concepts shown below the target concept *is most similar* to the target.” Participants were asked to check on the answer sheet whether they thought that the concept on the left or the concept on the right was more similar to or went best with the target item, depending on the group. In half of the trials, the option on the left was thematically related to the target, while the option on the right was taxonomically similar to the target. In the other half of the trials, the options were reversed.

**Results.** Similarity preferences were calculated based on the proportion of triads for which the thematic option was chosen, referred to as thematic proportion (Golonka & Estes, 2009). The thematic proportion over all participants ranged from .00 to .85, and the mean was .49 ( $SD = .24$ ). Table 2-1 shows descriptive statistics for thematic proportion, with the sample

divided into the experimental conditions (“go together” or “similar”) and items used by Lin and Murphy (2001) and items controlled for equidistance in association strength between concepts.

		<b>similar</b> <b>(N = 30)</b>	<b>go</b> <b>together</b> <b>(N = 31)</b>	<b>total</b>
<b>Lin &amp; Murphy</b> <b>(N = 61)</b>	<b>mean</b>	.53	.71	.62
	<b>max</b>	.90	.95	.95
	<b>min</b>	.00	.00	.00
	<b>SD</b>	.33	.25	.31
<b>Equidistant</b> <b>(N = 61)</b>	<b>mean</b>	.31	.39	.35
	<b>max</b>	.80	.65	.80
	<b>min</b>	.00	.00	.00
	<b>SD</b>	.24	.17	.21
<b>Total</b> <b>(N = 61)</b>	<b>mean</b>	.42	.55	.49
	<b>max</b>	.85	.80	.85
	<b>min</b>	.00	.25	.00
	<b>SD</b>	.26	.20	.27

Table 2-1: Descriptive statistics for thematic proportion.

In contrast to the findings of Lin and Murphy (2001) and Golonka and Estes (2009), most of the participants showed no clear preference for either thematic or taxonomic similarity. The distribution was not polarized in either the *similar* or the *go together* group. For example, in the *similar* group, 33.3% of the participants showed a clear preference for taxonomic similarity by choosing the thematic option in 30.0% or less of the trials, and 6.6% of the participants showed a clear preference for thematic similarity by choosing the thematic option in 70% or more of the trials. These results differ greatly from the ones reported by Golonka and Estes (2009).

Correlations were run in order to explore possible relations among personality traits, creativity, mood, control variables, and similarity perception. Except for gender effects, no statistically significant correlations were revealed. The directions of the correlations remained relatively stable across conditions.

To test the hypotheses, t-tests were conducted. Both Hypothesis 1 ( $t(59) = 2.92$ ;  $p < .05$ ) and Hypothesis 2 ( $t(60) = 9.61$ ;  $p < .05$ ) were supported. The results of the study show that the association strength between the words within the trials, as well as the formulation of the instructions, influenced the outcomes of the thematic thinking tests. This will have to be taken into account when measures of thematic thinking are applied in research. Consequently,

identical conditions and items were used for the different main studies contained in the present dissertation.

### **2.1.3. Interviews and questionnaires for Indian sample**

One of the samples used in the present dissertation was collected in India (Chapter 4). In preparing the survey that was used as the basis of the empirical analysis within the study, two types of pretests were conducted.

First, in a short survey, the same word triads were tested that were used in the pretest with the German students, in order to ascertain whether they could be used for the Indian sample. All concepts contained in the prior pretest were transformed from word triads into word pairs. This was necessary to be able to test the understanding for all possible combinations of concepts that could be chosen by the participants of the triad test. For example, the word triad “sailboat–yacht–sea” was transformed into the items “sailboat–yacht” and “yacht–sea.” Participants had three options to choose from for each dyad: “The concepts are similar/go together in some way,” “I do not see a connection between the concepts,” and “I do not know/understand one (or both) of the concepts.” Nine university-educated Indians 20–30 years of age participated in the survey. The results indicated that the items could be used in a survey targeting university-educated Indians, as no participant stated that she or he did not know or understand the concepts, and the first option (“The concepts are similar/go together in some way”) was chosen most frequently by the participants.

Second, 19 qualitative interviews were conducted. The interviews aimed at gaining a better understanding of the work environment of the individuals who took part in the field study, which is presented in Chapter 4. Conducting these interviews was important due to the specific context of the study. All participants worked for the same Indian IT service provider in the field of R&D, and this study was, to my knowledge, the first of its kind conducted in this context. The interview questions focused on operational procedures and project phases, idea development, interactions within the company (e.g., knowledge exchange), and identification of performance indicators. All interviewees were male, 31–50 years of age, and had at least a bachelor’s degree (five had a PhD). To gain a comprehensive picture of the organization’s R&D activities, individuals from a wide range of positions were interviewed. Figure 2-3 shows an overview of the positions of the interview partners.

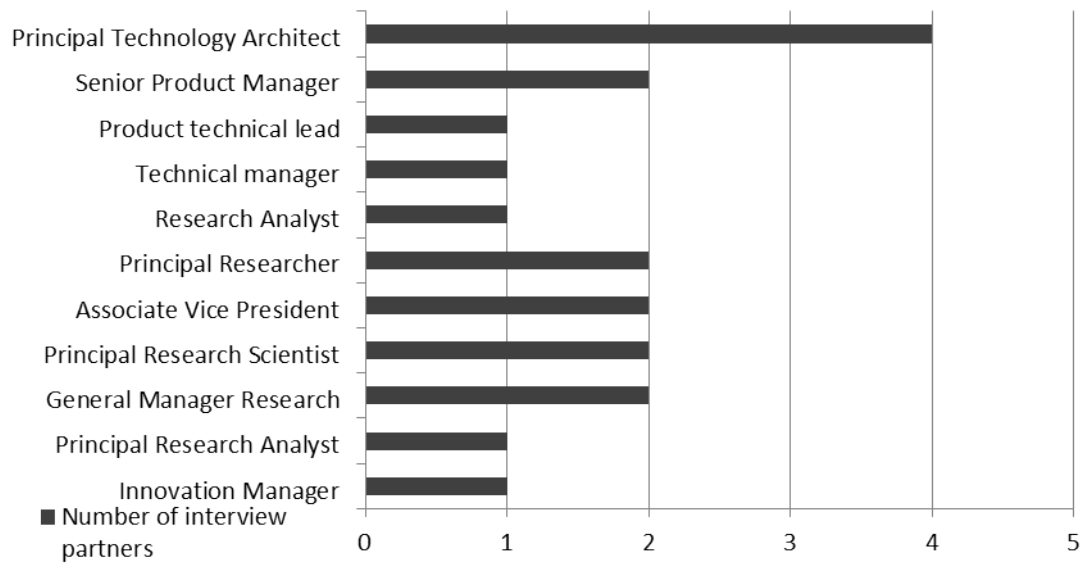


Figure 2-3: Positions of interview partners.

## 2.2. Data Collection and Samples

The pre-studies described above built the basis for the four empirical field studies, which make up the main part of the present dissertation. Two of the studies assess thematic thinking on the individual level using the word triads, which were tested and partly developed in the course of one of the pre-studies. The questionnaire used in the second individual level study, which is presented in Chapter 4, builds on the findings of the pre-studies conducted in the Indian context. The studies presented in Chapters 5 and 6 examine thematic thinking at the idea level. The coding techniques for these studies are based on the experience gained from the explorative coding of the idea competition data described in 2.1.1. In these two studies, evaluations of thematic ideas in different contexts are examined: the study in Chapter 5 is placed within the R&D context, while the study in Chapter 6 is placed within the M&A context. Table 2-2 provides an overview of the studies' samples and the means of data collection and analysis.

	<b>Chapter 3</b> Thematic Ideation – Antecedents and Outcomes of Individuals’ Thematic Similarity Recognition	<b>Chapter 4</b> Thematic Thinking and Individual Performance in Research and Development	<b>Chapter 5</b> Idea Selection in Suggestion Systems: A Thematic Similarity Perspective	<b>Chapter 6</b> How Type of Similarity Affects Decision Making: Evidence From Investor Reactions to M&A Announcements
<b>N</b>	199	172	378	193
<b>Related pre-study</b>	Development of triad test	Development of triad test; interviews and questionnaires for Indian sample	Analysis of idea competition	Analysis of idea competition
<b>Source of independent variable</b>	Survey data	Survey data	Coding/content analysis of innovation ideas by two trained coders	Coding/content analysis of press releases announcing mergers by one expert coder
<b>Source of dependent variable</b>	Survey data	Survey data	Idea evaluations by up to 15 experts working for the examined company	Investor reactions defined as CAAR
<b>Method</b>	Regression analyses (multiple hierarchical regression)	Regression analyses (hierarchical regression; moderated mediation)	Regression analyses (multiple hierarchical regression)	Mean comparison (Böhmer test, t-test, Johnson test, Wilcoxon signed rank test)

Table 2-2: Overview of data collection and samples.

### 3 Thematic ideation – Antecedents and consequences of individuals' thematic similarity recognition<sup>1</sup>

#### ABSTRACT

Work on thematic thinking, an individuals' preference for basing decisions and cognitive processes on thematic similarity, has been developed recently. These preferences also build the basis for idea generation (thematic ideation) and evaluation processes. Research results indicate that there are inter-individual differences in these preferences. We apply these findings from the field of cognition to the business context and theoretically develop a set of antecedents and consequences of thematic thinking. Results indicate that experience and positive affect are positively related to thematic thinking while formal education is negatively related to thematic thinking. The consequences that were examined, adaptation and creativity, showed relations which were reverse to the ones hypothesized based on related prior literature. Counter-intuitively, adaptation showed to be positively related to thematic thinking while creativity showed to be negatively related. We discuss theoretical and managerial implications and highlight avenues for future research on thematic thinking.

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<sup>1</sup> This paper was written by Julia K. Froehlich, based on conjoint work with Prof. Dr. Martin Högl and published in the Journal of Creativity and Innovation Management (Froehlich, J. K. & Hoegl, M. 2012. Thematic Ideation - Antecedents and Consequences of Individuals' Thematic Similarity Recognition. *Creativity & Innovation Management*, 21(4): 443-456). Prior versions were presented at the Annual Meeting of the Academy of Management (AOM), 2012, in Boston, and at the Annual Meeting of the European Academy of Management (EURAM), 2012, in Rotterdam.

### 3.1. Introduction

A wide range of cognitive processes are based on similarity recognition. These processes include idea generation, creativity, perception, recognition, knowledge representation, analogy recognition, categorization, and reasoning (Ashby & Perrin, 1988; Gassmann & Zeschky, 2008a; Gentner & Markman, 1997; Goldenberg & Mazursky, 1999; Hampton, 1988; Hampton, 1998; Ordoobadi et al., 2005; Saalbach & Imai, 2007). Recently, a stream of literature dealing with different kinds of similarity has emerged (Estes, 2003; Estes et al., 2011; Gassmann & Zeschky, 2008b; Golonka & Estes, 2009; Lin & Murphy, 2001; Murphy, 2001; Simmons & Estes, 2008). Cognitive psychologists discriminate between taxonomic and thematic similarity. Two objects are taxonomically similar if they share a certain number of features and therefore belong in the same category (Farjoun & Lai, 1997; Tversky, 1977). For instance, dogs and cats are taxonomically similar because they share some internal features: they are pets, have four legs and a tail. This definition dominates Western thinking in general as well as in the business context in particular. In contrast, two entities are thematically similar if they show an external relation by co-occurring or interacting in space and time (Estes et al., 2011; Golonka & Estes, 2009; Lin & Murphy, 2001). Hence, dogs would be rather connected to bones because they are externally related by the habit of dogs chewing on bones.

The concept of thematic similarity has hardly found its way into the business literature, even though similarity (or “fit”) plays an important role in a wide range of fields in business research ranging from marketing, to strategy formulation, and innovation (e.g., Bijmolt et al., 1998; Farjoun & Lai, 1997; Goldenberg et al., 1999; Park, Milberg, & Lawson, 1991). An important field where thematic similarity plays a role is idea development. Ideas are composed of several concepts which are similar in some way (Goldenberg et al., 1999; Hargadon, 2002). Therefore, the perception of similarity plays a role well before an idea even emerges (Gregan-Paxton & Moreau, 2003). Using thematic similarity as the basis for an idea can lead to different ideas than if taxonomic similarity is used. One example for a thematic idea given by Gibbert and Mazursky (2009) is the collaboration of Nike and Apple for the Nike+. The Nike+ is a running shoe that can be used in combination with an iPod nano, iPod touch, or iPhone 3GS or later (Apple Inc. 2012). This product combination makes it possible, for instance, to display miles run or pace on the display of the iPod. Despite the taxonomic dissimilarity between the two products, the Nike+ has been very successful. The thematic integration of shoe and iPod offers application possibilities for both products



that could not have been exploited by using a taxonomic approach. In today's business environment creativity and innovation are regarded as key factors for competitiveness and success (Miron, Erez, & Naveh, 2004; Sagiv, Arieli, Goldenberg, & Goldschmidt, 2010). Hence, finding new ways of reaching different yet profound solutions to problems by supplementing the taxonomic perspective with a thematic one is of high interest.

All this highlights the importance of how similarities are perceived. Recent research in cognition demonstrates that individuals show differences in their tendency to prefer either taxonomic or thematic relations (Golonka & Estes, 2009; Lin & Murphy, 2001; Murphy, 2001; Simmons & Estes, 2008). These differences could be shown in different tasks such as categorization (Lin & Murphy, 2001; Murphy, 2001) as well as judgments of similarity and dissimilarity (Simmons & Estes, 2008). The stimulus material used to assess these differences consists mainly of word triads (e.g., dog, cat, and bone) from which participants have to choose either the taxonomic pair (dog and cat) or the thematic pair (dog and bone). In these studies most participants showed either a strong preference for taxonomic or for thematic similarity, while only a minor proportion showed a mixed pattern. Furthermore, Simmons and Estes (2008) found thematic thinking to be negatively related to need for cognition. Being related to this stable construct further supports the assumption of stable inter-individual differences in thematic thinking.

Keeping in mind the apparent business implications of thematic thinking (Gibbert & Hoegl, 2011) identifying key antecedents and consequences of individuals' thematic thinking preference is highly relevant in such diverse areas as product creativity and strategy formulation. Therefore, in the present paper we investigate how the preference for either thematic or taxonomic similarity is influenced by a set of demographic and situational antecedents and how it is related to consequences, specifically creativity and adaptation.

The present paper contributes to different streams of literature in different ways. Firstly, an investigation of thematic thinking in the business context contributes to the creativity and innovation literature. Thematic thinking contributes to the literature on bounded creativity approaches (e.g., Goldenberg & Mazursky, 1999; Goldenberg et al., 1999; Sagiv et al., 2010). Specifically, thematic thinking offers a new perspective on bounded creativity, providing original solutions to problems without having to produce and evaluate an innumerable amount of ideas. Examining individual level antecedents and consequences of thematic thinking builds the basis for using this thematic innovation potential in practice.

Secondly, we contribute to the literature on thematic thinking by conceptually and empirically investigating different antecedents and consequences of inter-individual differences in thematic thinking preferences. Estes and colleagues (Estes et al., 2011; Simmons & Estes, 2008) took first steps in this direction. Besides their extensive review of the state of research (Estes et al., 2011) on thematic thinking they contributed to the literature on stable inter-individual differences of thematic thinking preferences by examining its relation with need for cognition (Simmons & Estes, 2008). There is evidence that there are different kinds of individual-level antecedents and consequences of thematic thinking that are relevant in a business context (Bless et al., 1996; Estes et al., 2012; Estes et al., 2011; Simmons & Estes, 2008; Smiley & Brown, 1979). However, this literature is scarce. We contribute by integrating evidence of a set of individual level antecedents and consequences.

### **3.2. Thematic thinking**

Thematic similarity describes the relation of things that are externally related by co-occurring or interacting in space and time (Estes et al., 2011; Golonka & Estes, 2009; Lin & Murphy, 2001). Thematic thinking is based on this kind of relations and describes cognitive processes and their outcomes based on thematic similarity. Thematic ideation refers to basing the development of new ideas on this kind of cognitive process.

Adults are able to process taxonomic as well as thematic similarity, and these are of different use in different situations (Estes et al., 2011). Conclusions that can be drawn by using taxonomic similarity cannot be drawn using thematic similarity and vice versa. Taxonomic categories do not only help to categorize and store information, they are also helpful in retrieving stored information and making assumptions about unknown objects (Cohen & Basu, 1987; Moreau, Markman, & Lehmann, 2001; Ross & Murphy, 1999). Taxonomic, feature-based similarity builds the basis for generalizations from one thing to another non-identical thing (e.g. objects, concepts, or people) and thus helps to interact appropriately with these things (e.g. not mixing up the dog and the leash), even if this particular thing had not been encountered before (Estes et al., 2011). For example, knowing that jogging shoes belong to the category of shoes tells us that they are worn on the feet and are not edible. This kind of inference is of great importance. Just imagine having to learn about the properties of every single shoe you encounter. Thematic similarity is used for different kinds of inference. It helps to generate expectations about scenarios and events (Estes et al., 2011). If someone asks you to go jogging with him or her, knowing that jogging

shoes are similar to hiking boots will not tell you what to expect of this event. A product example that builds on this kind of jogging theme is the Nike+.

The key properties of thematic similarity are externality (thematic similarity occurs between two or more things rather than within a single thing), and complementarity (those things must fulfill complementary roles in the given theme) (Estes et al., 2011). In contrast, taxonomically similar objects or entities tend not to complement each other. Two things belonging to the same taxonomic category will share features and attributes which constrain the possibilities of complementing each other. For example, jogging shoes and ski boots share a fair number of features and can be regarded as taxonomically similar, but at the same time due to these shared features, the possibilities of being externally related are constrained. Ski boots and snow are, in contrast, taxonomically dissimilar but related via a skiing theme which only can be realized because of their different characteristics. Hence, taking different roles in a theme results in thematically similar things tending to be taxonomically dissimilar (Estes & Jones, 2009; Golonka & Estes, 2009; Lin & Murphy, 2001; Wilkenfeld & Ward, 2001; Wisniewski, 1996; Wisniewski & Bassok, 1999; Wisniewski & Love, 1998). Therefore, thematic similarity, or basing cognitive processes and their outcomes on thematic similarity (what we call thematic thinking), is not a substitute but a supplement to taxonomic reasoning.

### **3.2.1. Demographic antecedents of thematic thinking**

Research in children's conceptual development postulates a thematic to taxonomic-shift, which means that small children rely on thematic similarity while older children and adults rely on taxonomic similarity (Blanchet, Dunham, & Dunham, 2001; Lucariello, Kyratzis, & Nelson, 1992; Lucariello & Nelson, 1985; Nelson & Nelson, 1990; Smiley & Brown, 1979). More recent research questions this assumption. Unexpectedly, Simmons and Estes (2008) found that under experimental conditions adults even prefer thematic similarity over taxonomic similarity. Smiley and Brown (1979) reported a non-monotonic, U-shaped developmental function. They found preschool-children and elderly adults demonstrating a thematic preference, while participants in the intervening ages demonstrated a taxonomic preference. Therefore, in a solely adult sample, there should be a positive relation of age and thematic thinking.

In formal education taxonomies are more present than themes (Lin & Murphy, 2001; Nation & Snowling, 1999; Osborne & Calhoun, 1998). Within the education system

taxonomies are part of the curriculum. Schoolchildren are taught that dogs are like cats because both are mammals; in contrast, the fact that dogs like to chew bones is not on the curriculum (Estes et al., 2011). Knowledge is organized and taught in taxonomies. Therefore, the more time people spend in the formal education system the more they should tend to prefer taxonomic similarity over thematic similarity.

We propose a distinction of the effects of age and formal education on the preference for thematic thinking. One reason for the U-shaped relation of age and thematic thinking found by Smiley and Brown (1979) could be that older children and younger adults (i.e. the groups that showed less thematic thinking) are either within the education process or recently graduated. Furthermore, we argue that one possible reason for the increase in thematic thinking with age is that with increasing life experience, experience with all kinds of themes increases as well. Taxonomic similarity is especially of use when drawing inference about things that have not been encountered before (Estes et al., 2011). Hence, it is likely that people rely on knowledge that is apprehended in a taxonomically oriented environment (like in school) if they do not have much of their own experiences to rely on. We argue that with increasing experience with all kinds of situations (i.e. themes), people rely more strongly on thematic similarity.

Proffitt, Coley, and Medin (2000) conducted a study about expertise and category-based induction. In their studies, the subjects were different kinds of tree experts. These tree experts took part in three experiments and were asked questions about the spreading of diseases among trees. The results show that these experts did not rely on taxonomic similarity when drawing inductions about disease possession but rather used a thematic reasoning strategy. We expect this finding to be applicable to the broader construct of work experience. So, individuals with more experience in their field of work should more strongly rely on their own experience and hence on thematic similarity.

Therefore, we conclude:

*Hypothesis 1: Experience is positively related to thematic thinking.*

*Hypothesis 2: Formal education is negatively related to thematic thinking.*

### **3.2.2. Situational antecedents of thematic thinking**

A wide range of situational cues generally influence cognitive processing (e.g. Anderson, Deuser, & DeNeve, 1995; Chaigneau, Barsalou, & Zamani, 2009; Holland, Hendriks, & Aarts, 2005). Especially mood has been found to influence cognition (Clore & Huntsinger, 2007). Positive affect can influence the way in which cognitive material is categorized or grouped together. This is also relevant for creativity tasks (Ashby & Isen, 1999; Isen & Daubman, 1984; Isen et al., 1987). A meta-analysis by Baas, DeDreu, and Nijstad (2008), summarizing the past 25 years of research on the relationship between mood and creativity, showed that positive mood is positively related with creativity. The results were consistent over different populations, designs and facets of creativity.

For categorization tasks, research results indicate that participants that are in a positive mood tend to make broader categories (Murray, Sujan, Hirt, & Sujan, 1990). Furthermore, in several studies with different kinds of stimuli individuals in a good mood were shown to rather attend “to the bigger picture” in their cognitive processing than sad individuals (Gasper & Clore, 2002; Labroo & Patrick, 2009). These results can be explained with individuals with positive affect adhering to a global processing mode while sad individuals show more attention to details and individual features. This feature-oriented mode should be more closely related to taxonomic similarity, which is based on features, while a global processing mode should be associated with thematic similarity.

This assumption is supported by a study by Bless and colleagues (1996). They presented participants with a situation which activated the scheme of “going to a restaurant”. Participants in a positive mood more often used information retrieved from the scheme to fill in the blanks when recalling the situation than did participants in a sad mood. As such, we argue that being in a good mood is positively related to the use of schemes, i.e. themes, as a basis for cognitive processing.

Therefore, we conclude:

*Hypothesis 3: Positive affect is positively related to thematic thinking.*

### **3.2.3. Consequences of thematic thinking**

The present state of research from the field of thematic thinking indicates that individuals with a preference for thematic similarity tend to process information in a more global way than do individuals with a taxonomic preference do (Bless et al., 1996; Estes et al., 2011). Assuming a broader way of interpreting and assembling information, we hypothesize a positive relation with creativity. Creativity involves producing ideas that are original but useful and worthwhile at the same time (Amabile, 1983). Thematic thinking should be useful to generate ideas with both attributes. Firstly, combining taxonomically distant concepts should lead to ideas that are more original than when combining taxonomically close concepts. Secondly, a thematic idea might lack a taxonomic logic but can still be based on valuable assumptions. Thematic thinking was found to enhance the focus on similarities while taxonomic similarity dominates cognitive processes when thinking about differences (Estes et al., 2011; Golonka & Estes, 2009). In order to form new, creative ideas people have to combine concepts (Goldenberg, Lehmann, & Mazursky, 2001; Goldenberg et al., 1999; Hargadon, 2002). So, focusing on thematic similarity can lead to the combination of concepts that one would not combine when focusing on taxonomic similarity because they are perceived as being too distant. Furthermore, Sagiv and colleagues (2010) found that intuitive individuals are more creative than systematic individuals. They characterize intuitive style as “the tendency to capture a pattern (e.g., meaning, structure) without being able to account for the source of the knowledge or information” (Sagiv et al., 2010: 1091). This intuitive style shows some parallels to thematic thinking. Therefore, we expect a similar relationship of thematic thinking and creativity, as found for intuitive cognitive style and creativity.

One set of cognitive styles that is explicitly tailored to the work context are adaptors and innovators by Kirton (1976). This concept is one of the most influential and has also inspired other conceptualizations and measures of cognitive styles (Miron et al., 2004). The differentiation of adaptors and innovators is built on the observation that people characteristically develop qualitatively different solutions to seemingly identical problems (Kirton, 1976). Using either thematic or taxonomic similarity as the basis for the solution of a given problem will lead to different solutions. Thus, a relationship of thematic thinking and cognitive styles seems apparent. Adaptors are characterized as cautious, reliable, efficient, methodological, disciplined and conforming. Innovators are characterized as undisciplined,

impractical, unsteady, and incapable to adhere to detailed work (Kirton, 1976). Adaptors do not break rules, work in prescribed ways and rather improve on given things than innovating new ones. We expect this kind of behavior to inhibit thematic thinking. Due to the dominance of taxonomic similarity in Western thinking and formal education, we expect thinking in themes to be regarded as rather unconventionally and a deviation from the prescribed ways.

Therefore, we conclude:

*Hypothesis 4: Thematic thinking is negatively related to adaptation.*

*Hypothesis 5: Thematic thinking is positively related to creativity.*

### **3.3. Method**

#### **3.3.1. Sample and Procedures**

The study was administered using an online questionnaire. All questions and other research material were presented in German. Participants were recruited via an online panel provider. Only participants aged between 18 and 65 years and pursuing a professional activity were contacted. Out of 400 potential participants, 282 accessed the survey. 199 participants completed all parts of the survey. This leads to a response rate of 49.75 %. Ninety participants were male (age: mean = 38.91 years;  $SD = 10.17$ ; education: mean = 4.90;  $SD = 1.67$ ; 37.8% had an academic degree) and 109 were female (age: mean = 47.26 years;  $SD = 7.69$ ; education: mean = 3.88;  $SD = 1.75$ ; 22.9% had an academic degree).

#### **3.3.2. Measures**

***Thematic thinking.*** To measure thematic thinking we used forced choice word triads. This kind of measurement has been used in the vast majority of studies concerned with thematic similarity (Golonka & Estes, 2009; Lin & Murphy, 2001; Simmons & Estes, 2008; Smiley & Brown, 1979). The main part of the triads we used were included previously in experiments by Lin and Murphy (2001) and Simmons and Estes (2008). Each triad consists of a base, a taxonomic and a thematic option to choose from (e.g., with dog as base concept, cat as the taxonomic option and bone as the thematic option). The word triads used in the present study reflect a general sense of themes. We chose these triads for three reasons.

Firstly, assuming that individuals show stable differences in their preference for thematic similarity these differences should show regardless of the context the themes are taken from (as long as the possible thematic relations are known to the subjects). Secondly, we wanted to use established test material which only existed for this rather general understanding of themes. Thirdly, the material would have been adapted to the specific work context or at least the industry the participants work in. As we aimed at obtaining results that could be generalized to the working population as a whole, this kind of “customizing” was not applicable in our present sample.

Participants were asked to choose the concept that is *most similar* to the base concept that was stated on top of the other two concepts. The position of the thematic and the taxonomic option (i.e. presentation on the left vs. on the right) was randomized over all triads. Hence, in half of the trials the taxonomic option was presented on the left and the thematic option on the right and vice versa. Overall, 40 triads were presented. Thirty of the triads were selected from the items used in prior studies. The remaining ten items were developed by the authors with regard to the thematic option and the taxonomic option being equally strong associated with the base item. The items taken from prior studies are established but not controlled for association strength. Prior research on thematic thinking (Estes et al., 2011; Simmons & Estes, 2008) and our own pre-tests indicate that the association strength between items presented within the trials has an effect on the recognition of thematic relations. Information about the strength of the associations – defined as free association probability - was collected from a database provided by the University of Florida (Nelson, McEvoy, & Schreiber, 1998). Two items had to be excluded from our analyses. The word triad “cat, lion, litter box” triggered participant responses that did not show any systematic relation with the rest of their responses. We found that unlike American participants, Germans did not see any possible interaction of cat and litter box and therefore chose solely the taxonomic option (lion). The first triad (dog, cat, bone) was used to explain the task and presented together with the instruction. Due to these differences in presentation we excluded this triad from the analyses as well. Therefore, the thematic thinking score for the entire set includes 38 triad responses and the subset of established 28 items. For including these scores in our analyses, we calculated the thematic proportion (see Golonka & Estes, 2009; Simmons & Estes, 2008), i.e. the percentage of triads that were answered with the thematic option. All word triads used are shown in Table 3-1. Excluding the equidistant triads leads to the same pattern of results as using the full set of 38 triads with only marginally



differing coefficients. Hence, all analyses run and reported in the results section refer to the full 38-item measure.

No.	Base	Taxonomic	Thematic	No.	Base	Taxonomic	Thematic
1	dog	cat	bone	21*	yacht	sailboat	sea
2	saxophone	harp	jazz	22	monastery	synagogue	monk
3*	wine	champagne	cellar	23	panda bear	grizzly bear	bamboo
4	pepperoni	pork chops	pizza	24	king	president	crown jewels
5*	accident	mishap	ambulance	25	camel	antelope	desert
6	turkey	swan	thanksgiving	26	chalk	marker	blackboard
7	hot dog	steak	mustard	27*	tablet	capsule	water
8*	demon	ghost	possessed	28	Tortilla chips	potato chips	salsa
9	police car	sedan	police officer	29*	knife	gun	fight
10	diamond ring	bracelet	engagement	30	cat	lion	litter box
11	can opener	bottle opener	can	31	organ	accordion	church
12	spider	wasp	spider web	32	swimming	golf	swimming suit
13*	milk	lemonade	calcium	33	crib	waterbed	baby
14	virus	bacteria	doctor	34	Hawaii	Missouri	beach
15	airplane	car	pilot	35*	vase	jar	rose
16	pencil	pen	eraser	36	Hollywood	Chicago	movie star
17	beer	juice	party	37	waitress	stewardess	restaurant
18	robbery	treason	bank	38*	horse	donkey	jockey
19	bee	flies	honey	39	French fries	baked potato	ketchup
20*	gin	wine	drunk	40	igloo	cabin	Eskimo

\* = newly developed, equidistant item

Table 3-1: Word triads.

**Adaptation.** Adaptation was measured with five items (Cronbach's  $\alpha = .65$ ) that were developed for the specific needs of the present study. The items were adapted from the Kirton adaption-innovation inventory (Kirton, 1976) and chosen based on considerations related to content validity. All items were rated on a five-point Likert scale ranging from "strongly disagree" to "strongly agree". In regard of the rather low Cronbach's  $\alpha$  we conducted a principal component analysis to see whether the low  $\alpha$  was caused by more than one underlying factor. The analysis led to only one component. Therefore, we decided to

keep our measure in the analyses despite the low alpha. The items used are shown in Table 3-2.

**Creativity.** Creativity was measured with three items (Cronbach's alpha .81), which were each rated by the participants on a five-point Likert scale ranging from “*strongly disagree*” to “*strongly agree*”. The items were adapted from a scale developed and published by Shalley, Gilson, and Blum (2009) and translated into German. The items used are shown in Table 3-2.

Variable	Items
Adaptation (adapted from Kirton, 1976)	I prefer changes to occur gradually. I am methodical and systematic. I am consistent. I am predictable. I like bosses and work patterns which are consistent.
Creativity (adapted from Shalley et al., 2009)	The work I produce is creative. The work I produce is original. The work I produce is novel.

Table 3-2: Items of the adaptation and creativity scales.

**Experience.** We measured experience using two different measures: the participants' age and the tenure in their present position (position tenure). Age as well as position tenure was measured in years ('Your age:\_\_\_ years'; 'How long have you been working in your current position?\_\_\_\_\_ years'). Both measures were included in the regression analysis. We included age together with the controls to see whether position tenure explains variance beyond age effects.

**Positive Affect.** Positive affect was measured with the self-assessment manikin test by Lang (1980). The measure has been validated and is very frequently used among other things because of it being speech-free and easy to use (Bradley & Lang, 1994). The test consists of three scales: valence, arousal and dominance. We presented seven pictures to the participants for each scale. Each of these pictures represents an increasing level of the given emotion. Participants had to choose which picture reflected their present mood best. All three scales were presented to the participants. Only the subscale *valence*, reflecting positive affect, was

used in the analyses, because of the lack of theoretical evidence indicating a relationship between thematic thinking and the emotions represented by the other scales.

**Control Variables.** We controlled for the Big Five personality factors extraversion, conscientiousness, agreeableness, emotional stability, and openness to experience. The five factors of personality were measured with the TIPI-G, which has been developed and validated by Gosling, Rentfrow and Swann (2003). The TIPI-G (Gosling et al., 2003) measures each dimension of the Big Five with two items. The items are formulated as self-descriptive adjectives (e.g., extraverted, enthusiastic). Each item was rated on a five-point Likert scale ranging from “*strongly disagree*” to “*strongly agree*”. We used the German version which was developed and validated by Muck, Hell and Gosling (2007).

Because of the differences in demographic characteristics such as age and education of males and females participating in the study, we included gender as a control variable in all regression analyses.

Table 3-3 shows means, standard deviations and correlations of all variables. As expected, there is no correlation between gender and thematic thinking ( $r = .02$ ;  $p > .10$ ). Altogether the pattern of correlations between age, gender, and education is generally in line with results from past research (e.g. Goldberg, Sweeney, Merenda, & Hughes, 1998; Tsui & Iii, 1989). For example males tend to have higher educational degrees ( $r = .29$ ;  $p < .01$ ) and age is negatively correlated with formal education ( $r = -.33$ ;  $p < .01$ ). Further indicators for the validity of the measures and the sample are the positive correlations of creativity with extraversion ( $r = .49$ ;  $p < .01$ ), openness to experience ( $r = .55$ ;  $p < .01$ ), and positive affect ( $r = .21$ ;  $p < .01$ ) (Baas et al., 2008; George & Zhou, 2001; Isen et al., 1987; King, Walker, & Broyles, 1996; McCrae, 1987).

### **3.4. Results**

We used hierarchical regression analysis to test our hypotheses. We calculated three models: one testing the antecedents of thematic thinking (Hypotheses 1-3) and two testing the consequences, creativity and adaptation, with thematic thinking, as antecedent (Hypotheses 4-5). To test the hypotheses related to the antecedents of thematic thinking we calculated a two-step model. In the first step, we regressed thematic thinking on the control variables (gender, extraversion, conscientiousness, agreeableness, emotional stability, and openness to experience) and age. In the second step, thematic thinking was regressed on the focal

variables position tenure (Hypothesis 1), formal education (Hypothesis 2) and positive affect (Hypothesis 3). In the models testing the consequences of thematic thinking, we ran three steps. For both dependent variables we entered the controls used in the first model in step one and the antecedents tested in step two. Furthermore, the consequence construct not being the dependent variable (creativity and adaptation respectively) was entered in step 2. To obtain a parsimonious model and as Model 1 showed that there is no significant effect beyond age, we did not include tenure as a control variable in Models 2 and 3 (Cohen, Cohen, West, & Aiken, 2003). In the third and final step adaptation (Hypothesis 4) respectively creativity (Hypothesis 5) was regressed on thematic thinking.

The results are shown in Table 3-4. Model 1 tested the relationships of thematic thinking with the antecedents experience, education and positive affect ( $F = 2.05$ ;  $R^2 = .10$ ;  $p < .05$ ). To test Hypothesis 1, age was entered in the first step ( $\beta = .20$ ;  $p < .05$ ) together with the controls while position tenure was entered in the second step to test for experience effects beyond age ( $\beta = .14$ ;  $p < .10$ ). Age and thematic thinking are significantly positively related, but there is no significant relationship for position tenure when entered after age. This leads to partial support for Hypothesis 1. As predicted in Hypothesis 2, thematic thinking and education are negatively related. However, this relationship is not significant ( $\beta = -.11$ ;  $p > .10$ ). There is a significant positive relationship between thematic thinking and positive affect ( $\beta = .16$ ;  $p < .05$ ) supporting Hypothesis 3.

Model 2 and model 3 tested Hypothesis 4 and Hypothesis 5 which are related to the consequences of thematic thinking, adaptation (Model 2:  $F = 4.32$ ;  $R^2 = .20$ ;  $p < .05$ ) and creativity (Model 3:  $F = 13.00$ ;  $R^2 = .43$ ;  $p < .05$ ). There are significant relationships of thematic thinking with adaptation ( $\beta = .15$ ;  $p < .05$ ) as well as with creativity ( $\beta = -.13$ ;  $p < .05$ ). However, the coefficients indicate that the relationships are reverse to the ones hypothesized: thematic thinking is negatively related to creativity and positively related to adaptation.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Thematic thinking	78.60	20.92												
2. Gender	.45	.50	.02											
3. Positive Affect	5.34	1.18	.12	-.20**										
4. Age	43.48	9.80	.16*	-.43**	.11									
5. Tenure Position	7.65	7.36	.18*	-.20**	-.04	.34**								
6. Formal Education	4.34	1.78	-.16*	.29**	-.11	-.33**	-.30**							
7. Adaptation	3.60	0.51	.10	-.12	.07	-.06	.10	.01	(.65)					
8. Creativity	3.50	0.75	-.08	.04	.21**	.04	-.13	-.03	.10	(.81)				
9. Extraversion	3.26	0.85	-.01	-.14	.25**	.09	.00	-.21**	.02	.49**				
10. Conscientiousness	4.01	0.76	.07	-.19**	.19**	.03	.09	-.19**	.35**	.03	.11			
11. Agreeableness	3.74	0.65	-.08	-.33**	.27**	.07	.05	-.06	.19**	.11	.13	.25**		
12. Emotional stability	3.70	0.73	-.03	.02	.22**	-.08	-.06	.03	.15*	.18*	.25**	.10	.19**	
13. Openness	3.82	0.72	.04	-.12	.19**	.12	-.07	-.07	.05	.55**	.45**	.21**	.16**	.17*

N = 199, \*\* =  $p < 0.01$ , two-tailed; \* =  $p < 0.05$ , two-tailed; + =  $p < 0.10$ , two-tailed.

For gender: 0 = female, 1 = male. Values in parentheses are reliability coefficients.

Table 3-3: Means, standard deviations, and correlations.

	Model 1		Model 2		Model 3	
Dependent variable	Thematic thinking		Creativity		Adaptation	
Predictors	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$
<b>Step 1</b>						
Gender	.09		.12 <sup>+</sup>		-.04	
Age	.20*					
Extraversion	-.03		.31**		-.05	
Conscientiousness	.10		-.09		.33**	
Agreeableness	-.09		.01		.09	
Emotional stability	.00		.03		.12 <sup>+</sup>	
Openness	.04		.43**		-.04	
		.05		.40**		.15**
<b>Step 2</b>						
Positive Affect	.16*		.10		-.04	
Tenure position	.14 <sup>+</sup>					
Age			.04		-.08	
Formal education	-0.11		.02		.06	
Creativity					.18*	
Adaptation			.13*			
		.05*		.02		.03
<b>Step 3</b>						
Thematic thinking			-.13*		.15*	
				.02*		.02*

N = 199; \*\* =  $p < 0.01$ , two-tailed; \* =  $p < 0.05$ , two-tailed; <sup>+</sup> =  $p < 0.10$ , two-tailed.

For gender: 0 = female, 1 = male.

Table 3-4: Results of regression analysis of antecedents of thematic thinking.

### **3.5. Discussion**

The present study is an important step for the conceptualization and application of thematic thinking as an individual-level construct in the business context.

#### **3.5.1. Theoretical implications**

Hypothesis 1 proposed a positive relationship between experience and thematic thinking. Our results support this proposition for experience approximated with age. The results also indicate a positive relationship with position tenure. However, position tenure does not explain a significant amount of variance beyond age, indicating that the mechanism underlying this relationship is similar to the one underlying the connection between age and thematic thinking. This is in line with the results of Smiley and Brown (1979), who found a U-shaped relationship between thematic thinking and age, but included five age groups (preschool, first grade, fifth grade, college adults, and elderly adults). Of these age groups, the college adults and elderly adults are approximately equivalent to the age group of the present sample. Smiley and Brown (1979) found an increase in thematic thinking between these age groups.

The results failed to give empirical support to Hypothesis 2. These results could be interpreted as an indicator for the assumption that experience makes people rely on their thematic knowledge, while formal education fosters a taxonomic preference. This relationship is new to the literature on thematic thinking and contributes to disentangling its antecedents and points to the need for more fine-grained analyses. As such, our study points to the need for more research to explore the relationship of education and thematic thinking.

Hypothesis 3 proposed that positive affect has a positive relationship with thematic thinking. The results support this hypothesis. This finding fits well in the bigger picture of the relation of positive affect and cognition. Prior research has found positive affect to influence a broad range of cognitive phenomena such as semantic priming, heuristic processing, false memories, schema-guided memory, retrieval-induced forgetting and stereotyping (Clore & Huntsinger, 2007). Some of these phenomena, e.g., schema-guided memory, are closely related to thematic thinking. The present results are in line with prior research results, indicating that individuals in a positive mood rely more on a global processing style than do individuals in a sad mood. Furthermore, the finding that thematic thinking is related to mood

is important for future research. To gain valuable insights in the field of thematic thinking, it will be important to control for mood when conducting empirical studies.

The results for the consequences of thematic thinking (adaptation and creativity) were opposite of what we had hypothesized based on the literature. As such, we can only speculate on possible reasons for these surprising findings, offering intriguing research opportunities for future work on thematic thinking. The positive relationship of adaptation and thematic thinking seems counterintuitive, both with regard of the state of research reviewed in the present paper and the results of the tests of Hypothesis 1-3. However, precisely these results may offer a possible explanation. This study's findings indicate that individuals who are systematic in their work and rather wary of rapid change tend to engage more in thematic thinking than individuals who show a weaker preference for this kind of work environment. As such, the adaptation scale used in this study comprised these aspects (e.g., "I like changes to occur gradually"; "I am methodical and systematic"). Changes that occur gradually and stable work environments leave more time to extensively experience the themes in the work environment than rapidly changing ones do. Just as experience over time was shown to be positively related with thematic thinking, this kind of in-depth experience might lead people to rely more on their knowledge that is organized in themes, i.e., knowledge they gained while living the themes themselves in many of their facets. People who enjoy working in stable environments and in consistent ways might do so because they want to use their experience to solve problems. Furthermore, our adaptation scale included items related to being consistent and predictable. These attributes might be related to thematic thinking because themes also include the course of action in a given situation. In a restaurant theme, it is quite clear that the waiter first takes the order and then brings the food and not vice versa. Themes make situations and the related actions predictable and people relying on them might act according to them and therefore describe themselves as predictable and consistent. It seems possible that this intensive kind of experience and its usage fosters thematic thinking, because firstly having experienced the work environment in depth lays the foundation by providing thematic knowledge, and secondly using it leads people to act in predictable and consistent ways.

In their research on similarity and processing ease in evaluation of brand extension, Estes and colleagues (Estes et al., 2012) found that thematic brand extensions were processed more rapidly, judged less novel and evaluated more positively than taxonomic brand extensions. These findings might explain the negative relationship between creativity and



thematic thinking. Individuals with a preference for thematic similarity might tend to produce more thematic ideas which they do not judge as being novel and therefore evaluate themselves as not being creative. This issue could be addressed in future research by not measuring creativity with self-assessments and rather use peer evaluations or expert evaluations of creative outputs produced by the participants. When using a research design of this kind it should be controlled for the thematic preference of the evaluators, as this might influence as to how novel and useful ideas are evaluated. As stated above, Estes and colleagues (2012) found that under certain conditions thematic ideas are evaluated more positively than taxonomic ideas but at the same time are judged as being less novel. In the present study, no definition of creativity was given to the participants before judging their own. Presenting a definition could minimize the risk of participants putting too much stress on the aspect of novelty in comparison to the aspect of worthiness when assessing their own ideas.

### **3.5.2. Managerial implications**

Research indicates that adults not only differ in their preference for these ways of processing information, they are also able to use both kinds of similarity and can be trained to do so (Estes et al., 2011; Smiley & Brown, 1979). This underlines the managerial value of this construct: if people can be trained to find thematic solutions, the advantages of thematic thinking can be fostered and used systematically.

Thematic ideas deliver valuable input for creativity and innovation processes. The present study reveals relationships with variables that are of importance in the business context and have been shown to be related to important work outcomes (Judge, Cable, Boudreau, & Bretz Jr, 1995; McDaniel, Schmidt, & Hunter, 1988; Miron et al., 2004; Ng, Eby, Sorensen, & Feldman, 2005). Thematic and taxonomic thinking will lead to different kinds of inference and concept combination (Estes et al., 2011). For different situations or tasks, different kinds of usage of similarity can be of use. For example, one may want to compose a team that engages in both ways of thinking or assign somebody to a task that should have a thematic output. For the first situation, managers should set-up a team diverse in experience, educational background and cognitive style. In the latter situation, the task should be assigned to an experienced and adaptive person (ideally in a very good mood).

Despite its dispositional base, thematic thinking can be easily apprehended and be influenced, for example by priming (Estes et al., 2011; Smiley & Brown, 1979). This makes thematic thinking a possible field of personal development. Individuals are capable of using taxonomic as well as thematic similarity (Estes et al., 2011). Therefore, for different kinds of (creativity) tasks, demanding different kinds of inference and ideation, individuals could be directed in using one or the other kind of similarity. Keeping in mind that mood has an effect on how people think and how they build connections between concepts could also be of value for the design of work environments and the evaluations of ideas. Being in a good mood can bias the evaluation of ideas and direct their construction. Therefore, keeping people who are supposed to think in themes in a good mood and having an eye on the mood of people generating and evaluating ideas, is one piece of managerial advice that can be extracted from the present study.

### **3.5.3. Limitations and future research**

The present study has some limitations that are worth noting. The data used are cross-sectional and not longitudinal. A longitudinal research setting would be helpful to determine causality of the relationships of the concepts examined. Furthermore, a longitudinal design could deliver valuable insights on the stability of inter-individual differences in thematic thinking. The relationships found with other inter-individually stable constructs, i.e., cognitive styles, indicate stability of the differences in thematic thinking. Yet, a longitudinal study would be able to deliver stronger evidence and could also help to shed light on the direction of relationship between thematic thinking and adaptation and creativity. Furthermore, our study used a solely German sample. While the results gained with the present sample should be generalizable to other Western cultures, there could be inter-cultural differences, especially between Westerners and East Asians (Estes et al., 2012; Estes et al., 2011; Nisbett, Peng, Choi, & Norenzayan, 2001). Nisbett et al. (2001) postulate different systems of thought for East Asian and Western cultures. Holistic cognition, which is associated with East Asian cultures, shows parallels to thematic thinking as it is less feature-oriented than the analytical cognition associated with Western cultures. So disentangling the cultural differences in thematic thinking is a promising field for future investigations.

Another avenue for future research, which could also help explain why thematic thinking is positively related to adaptation while being negatively related to creativity, is the

cognitive effort related to thematic thinking. If adaptation is a way to minimize cognitive effort while creativity increases the cognitive effort and thematic processing tends to take less cognitive effort than taxonomic processing does, this could be an important step to explaining this relationship. This would fit with existing research indicating a negative relationship of need for cognition and thematic thinking and a positive relationship between need for cognition and creativity (Dollinger, 2003; Simmons & Estes, 2008). We encourage future research efforts to investigate such possible explanations. And as mentioned above, the measurement of creativity could be improved by using other kinds of measures. Especially triangulating different ways of measurement would be insightful to learn more about the relationship between thematic thinking and creativity when defined and measured in different ways, capturing a multi-faceted understanding of the concept.

It would also be insightful to develop ways of measurement that are more explicitly tailored to specific contexts. For example, developing measures capturing themes of certain industries would make it possible to compare thematic thinking in relation to industry experience or compare the tendency to think thematically between industries. We believe that our conceptual and empirical analysis may provide some basis for such necessary future work.

## **4 Thematic thinking and individual performance in research and development<sup>2</sup>**

### **ABSTRACT**

The present paper investigates the relationship between thematic thinking and individual performance in the field of research and development (R&D). Thematic thinking is a concept from the field of cognitive psychology that emerged recently. It is based on the assumption that individuals differ in their preference for processing information on the basis of taxonomic, feature-based similarity, or thematic, relation-based similarity, and that these differences affect innovative behavior. We use survey data from the employees of a multinational IT services firm and apply a moderated mediation model to investigate the proposed relationships of thematic thinking and individual-level performance indicators. We find a positive relationship between thematic thinking and innovativeness, as well as individual job performance. The relationship between thematic thinking and job performance is fully mediated by innovativeness. The results do not support the postulated moderation of the innovativeness–job performance relationship by employees’ political skill. We discuss our findings in the context of R&D and derive theoretical and practical implications as well as avenues for future research.

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<sup>2</sup> This unpublished working paper was written by Julia K. Froehlich, based on conjoint work with Prof. Dr. Martin Hoegl and Dr. Matthias Weiss.

## 4.1. Introduction

Every innovation starts with an idea (Cooper, 1996). An idea is usually composed of several concepts that are similar in some way (Goldenberg et al., 1999; Hargadon, 2002). Therefore, the perception of similarity is significant even before an idea emerges (Gegan-Paxton & Moreau, 2003). The individual performance of a professional in research and development (R&D) is closely related to his or her ability to generate and promote innovative ideas. In the present study, we investigate the relationships between similarity perception, innovativeness, and performance in the R&D context. Specifically, we apply a concept from the field of cognition that recently emerged: thematic thinking (Estes et al., 2011).

Thematic thinking relates to the individual preference for basing cognitive processes on thematic similarity and can be closely linked to cognitive style (Froehlich & Hoegl, 2012). Even though similarity recognition builds the basis for many cognitive processes, including creativity and assessment of fit, business literature on thematic thinking remains scarce. In the context of similarity, a traditional, taxonomic perspective is commonly applied (e.g., Farjoun & Lai, 1997; Rosa & Porac, 2002). Taxonomic similarity implies that two entities are similar to the extent that they share internal features and consequently belong to the same category (Estes et al., 2011; Markman & Wisniewski, 1997; Tversky, 1977). From this perspective, jogging shoes and hiking boots are very similar because both are worn on the feet, have soles and laces, and belong to the category of shoes (Froehlich & Hoegl, 2012). Thematic similarity, in contrast, relates to external relations between entities. Similarity in a thematic sense is based on two or more entities co-occurring or interacting in space and time (Estes et al., 2011). Hence, jogging shoes are also similar to mp3 players because a lot of people listen to music while running.

We argue that within the context of R&D, taxonomic logic is predominating. The literature on similarity posits that adults' concepts in general, and specifically in the business context, are dominated by taxonomic logic (Froehlich & Hoegl, 2012; Gibbert & Hoegl, 2011; Lin & Murphy, 2001). Furthermore, a high level of education and a young age, which are prevalent in the R&D context (Ball, 1998; Cha, Kim, & Kim, 2009; Chang, Choi, & Kim, 2008; Cordero, DiTomaso, & Farris, 1994), are shown to be negatively related to thematic thinking (Estes et al., 2011; Froehlich & Hoegl, 2012; Smiley & Brown, 1979).

Thus, can thematic thinking be linked to performance in the R&D context? Idea generation builds on similarity. To generate a new idea, similar concepts are combined, that

is, are related in some way (Goldenberg et al., 2001; Goldenberg et al., 1999; Hargadon, 2002). Therefore, basing ideas on one kind of similarity or another should lead to different kinds of ideas. These differences should lead to diverging evaluations of these ideas, or differences in the assessments of the innovative performance of the individuals generating them. Furthermore, in a context supposedly dominated by taxonomic logic, attending to thematic similarity and basing ideas on such processes should be regarded as more innovative than attending to the taxonomic logic, and should therefore be closely related to judgments of innovativeness. In the R&D context, having innovative ideas is of utmost importance and is closely related to individual performance (Bakker, Boersma, & Oreel, 2006; Ming-Huei & Kaufmann, 2008; Scott & Bruce, 1994). Therefore, we argue that in this specific context, thematic thinking is positively related to job performance.

Although it is a necessity for job performance in the field of R&D, being creative and generating novel ideas is not sufficient. Creative outputs have to be “sold” within the company in order to lead to success (Baer, 2012). It has been argued that job performance is composed of contextual and task performances (Motowildo, Borman, & Schmit, 1997); therefore, only responding to the task, of which idea development is an important part, can only represent a part of one’s overall performance. As ideas based on thematic similarity may deviate from the analytic, taxonomy-based approach, selling these kinds of ideas might be more difficult (Gibbert & Hoegl, 2011; Mueller, Melwani, & Goncalo, 2012). In order to translate creativity into performance by implementing one’s ideas, different aspects of political skill have been shown to be of key importance (Baer, 2012; Blickle et al., 2011c; Ferris et al., 2005). Therefore, besides testing the effects of thematic thinking on performance indicators, we also investigate whether and how political skill moderates the relationship between innovativeness and job performance.

The present paper contributes to the literature in different ways. First, we contribute to the literature on thematic thinking by examining its relationship with performance indicators. Thematic thinking has already been shown to be related to inter-individual differences that relevant in the business context (Froehlich & Hoegl, 2012; Simmons & Estes, 2008). However, research linking thematic thinking directly to performance is still lacking. Furthermore, the present study focuses on R&D professionals. We use the term “R&D professionals” to refer to individuals working in the R&D department or related fields of a firm whose main tasks focus on the development of new products. Due to the close relation between similarity and idea generation, we argue that thematic thinking should be especially

important to individual performance when the generation of new ideas is of high importance. Hence, the present study also contributes to the R&D literature by deploying thematic thinking to better understand individuals' innovative performances.

Second, we contribute to the literature on political skill in organizations. Political skill has been shown to be a valid predictor of job performance and to moderate relationships between individuals' behaviors and characteristics as well as job performance (Blickle et al., 2011c; Ferris et al., 2008; Semadar, Robins, & Ferris, 2006). Even though selling ideas is important in the R&D context, as should be political skill, to our knowledge, this is the first study to explicitly examine political skill within this context.

The article is structured as follows. We review the present state of research related to thematic thinking and apply it to the context of R&D. We then develop hypotheses and empirically test them on a sample of 172 R&D employees of an IT services firm. The paper closes with a discussion of the study's theoretical and practical implications and its limitations, as well as avenues for future research.

## **4.2. Theory**

Thematic thinking, the independent variable in our research, relates to cognitive processes and their outcomes, which are based on thematic similarity. Two or more entities are thematically similar if they are externally related by their co-occurrence or interaction in space and time (Estes et al., 2011; Golonka & Estes, 2009; Lin & Murphy, 2001). Recent research in the field of cognition shows that this kind of similarity, contrary to former assumptions, influences the cognitive processing of adults (Estes et al., 2011; Golonka & Estes, 2009; Lin & Murphy, 2001; Simmons & Estes, 2008). Based on these findings, a dual-process model of similarity has been proposed, postulating taxonomic, feature-based similarity as well as thematic similarity to build the basis of similarity in cognitive processes (Estes, 2003; Wisniewski & Bassok, 1999).

To illustrate the differences between the models of similarity, a simple example can be applied. Milk, lemonade, and coffee are all similar in different ways (Estes et al., 2011). All three concepts are taxonomically similar, but to different extents. All three are drinkable liquids, yet milk and lemonade are more similar, as both are light in color and usually served chilled. In contrast, from a thematic perspective, coffee and milk are most similar because both interact in a 'coffee drinking' theme, as many people drink their coffee with milk. Hence, following the dual-process model of similarity perception, milk and coffee are judged

as most similar by most individuals, as they are thematically related and also share features. Generally, concepts that are thematically related are judged to be more similar than concepts that are thematically unrelated (Estes et al., 2011; Golonka & Estes, 2009; Simmons & Estes, 2008; Wisniewski & Bassok, 1999).

The example shows that entities can, to some extent, be similar thematically as well as taxonomically. However, the extent of being similar in both ways is constrained. In order to be thematically similar, entities, by definition, have to fulfill complementary roles in the same scenario or event, which is only possible if they are different in regard to important features (Estes, 2003; Estes et al., 2011; Estes & Jones, 2009; Golonka & Estes, 2009; Lin & Murphy, 2001; Wilkenfeld & Ward, 2001; Wisniewski, 1996; Wisniewski & Bassok, 1999; Wisniewski & Love, 1998).

In business practice, this model of similarity can be applied to new product development for generating new ideas (Estes et al., 2012). For instance, when considering the product line of Adidas, a manufacturer of sports apparel, thematic as well as taxonomic brand extensions can be developed. Hiking boots are very similar, in terms of features, to jogging shoes, one of Adidas' core products. Sandals, on the contrary, are less similar to hiking boots in terms of features, but do show a thematic relation to them, as individuals often wear sandals while taking a shower in the gym after their workout or when they go swimming. A thematically similar and taxonomically very dissimilar example is Adidas deodorant, which shares almost no features with sports apparel, but has a strong thematic relation to the product line by being part of a workout theme.

Thematic thinking is conceptually closely related to cognitive styles (Froehlich & Hoegl, 2012), which are defined as individuals' preferred ways of processing information (Messick, 1984). Individual differences in thematic thinking are defined as and based on individual preferences for either thematic or taxonomic similarity as bases for cognitive processes (Froehlich & Hoegl, 2012). Hence, while thematic relations are easily identifiable and understood, individual differences exist in the preference for thematic similarity (Estes et al., 2011; Froehlich & Hoegl, 2012; Simmons & Estes, 2008; Smiley & Brown, 1979). Thus, not only can the antecedents and outcomes of individuals' similarity preferences be identified; when situations are identified, in which one or the other processing mode leads to better results or greater success, people can be instructed to use a suitable kind of similarity in the corresponding situation.



### 4.3. Hypotheses

R&D professionals show some specific characteristics that are relevant in the context of thematic thinking as well as job performance. Moreover, innovativeness, that is, idea generation, is an important part of their output and performance evaluations (Bakker et al., 2006; Ming-Huei & Kaufmann, 2008; Scott & Bruce, 1994); R&D professionals are also typically younger and more highly educated as compared to the average member of the workforce (e.g., Ball, 1998; Cha et al., 2009; Chang et al., 2008; Cordero et al., 1994).

Previous research results have indicated an inverted U-shaped relationship between age and thematic thinking, with children and the elderly having the strongest preferences for thematic similarity, and young adults having a stronger preference for taxonomic similarity (Smiley & Brown, 1979). Furthermore, formal education is postulated to be negatively related to thematic thinking (Estes et al., 2011; Froehlich & Hoegl, 2012). Scholars argue that reliance on taxonomic categories is emphasized in the education system (Estes et al., 2011). The negative effect of formal education is closely related to the effect of age, as individuals who are within the education system or who recently graduated show the weakest preferences for thematic similarity compared to other age groups (Estes et al., 2011; Froehlich & Hoegl, 2012). Thematic thinking has also been shown to be negatively related to the need for cognition (Simmons & Estes, 2008), indicating that individuals who enjoy thinking prefer taxonomic similarity. Assuming that higher education is closely related to the need for cognition and the enjoyment of thinking, this is in line with the proposition that formal education is negatively related to thematic thinking.

These research results indicate that a lower level of thematic thinking should be expected in R&D professionals compared to those in other occupations. We argue that in this taxonomically dominated environment, thematic similarity valuably supplements prevailing taxonomic similarity. Therefore, those individuals who have the analytical skills needed for their R&D profession but still adhere to thematic similarity are likely to perform better. First, this is because thematic ideas are conceptually different from taxonomic ideas and, hence, should be evaluated as being more novel, which is, by definition, one of the core aspects of creative or innovative ideas (Amabile, 1983). Second, due to the high level of education prevalent in R&D (Chang et al., 2008; Cordero et al., 1994), the taxonomic basis for adequate reasoning should be given for all employees in this area. Therefore, thematic thinking should

help the incumbents see the ‘bigger picture’ and transform this into higher levels of performance. Formally, we propose:

*Hypothesis 1: Thematic thinking is positively related to job performance.*

Furthermore, we argue that innovativeness mediates this relationship between thematic thinking and job performance in R&D professionals. As such, innovativeness is not identical to job performance, which can be regarded as a multi-faceted concept (Motowidlo, 2003; Motowidlo & Van Scotter, 1994; Motowidlo et al., 1997). Innovation is a multi-stage process within which social interactions (e.g., selling a new idea to one’s supervisor) or more routine tasks (e.g., working on incremental product improvements) are part of the job as well (Baer, 2012; Keller, 1992).

However, despite not being identical to the overall job performance of R&D professionals, innovativeness is a key element of their performance (Bakker et al., 2006; Ming-Huei & Kaufmann, 2008; Scott & Bruce, 1994). Therefore, a positive relationship between thematic thinking and job performance should be substantially driven by the positive effect of thematic thinking on innovativeness. We expect this kind of relationship for several reasons. First, as argued above, innovativeness is a key performance indicator for R&D professionals (Bakker et al., 2006; Ming-Huei & Kaufmann, 2008; Scott & Bruce, 1994); therefore, it should be strongly positively related to overall job performance. Second, thematic thinking is closely related to idea generation, which should be of higher importance to innovativeness than to other aspects of R&D professionals’ performance. Thus, we conclude that thematic thinking has a positive effect on R&D professionals’ job performance, which is mediated by innovativeness.

Further evidence of the positive relationship between thematic thinking and innovativeness in R&D can be drawn from research on problem solving styles (Chan, 1996; Treffinger, Selby, & Isaksen, 2008). Problem solving styles, similar to thematic thinking, are conceptually closely linked to cognitive styles. Problem solving styles and cognitive styles have been argued for and shown to influence innovative behavior (Barron & Harrington, 1981; Jabri, 1991; Kirton, 1976; Scott & Bruce, 1994). It has also been shown that in order to have a positive influence on innovativeness, or performance, the style has to fit the environment (Payne, Lane, & Jabri, 1990). Scott and Bruce (1994) examined a sample of R&D incumbents and argued for a positive relationship of intuitive problem solving style and

a negative relationship of systematical problem solving style on the basis of the assumption that a more intuitive problem solving style shows a better fit with the R&D environment. Analogically, we argue that thematic thinking, as opposed to taxonomic thinking, is positively related to innovativeness in the R&D context, which, in turn, is related to R&D professionals' job performance.

Therefore, we posit:

*Hypothesis 2: Innovativeness mediates the positive relationship between thematic thinking and job performance.*

We have argued that thematic thinking is positively related to innovativeness and job performance in R&D, and that the relationship between thematic thinking and job performance is mediated by innovativeness. Given these assumed relationships, it becomes clear, however, that innovative ideas must be somehow translated into performance. Especially in a taxonomically dominated environment, thematic ideas and insights are likely to be more difficult to sell to co-workers and supervisors, as they are likely to deviate from the expected (Gibbert & Hoegl, 2011; Mueller et al., 2012). This might weaken the postulated positive relationship between innovativeness and job performance. We argue that this issue can be overcome by R&D professionals using their political skills. Political skill is “the ability to effectively understand others at work, and to use such knowledge to influence others to act in ways that enhance one’s personal and/or organizational objectives” (Ahearn, Ferris, Hochwarter, Douglas, & Ammeter, 2004:311). For example, being able to influence others in order to promote one’s own ideas and consequently be perceived as a high-performing person should be helpful in translating innovativeness into performance. Political skill has been shown to be directly related to job performance, but also to moderate the relationship between individual characteristics and behaviors with job performance (e.g., Blickle et al., 2008; Ferris et al., 2008; Liu et al., 2007; Semadar et al., 2006). Furthermore, supporting our argument, research has shown that networking abilities, which are part of political skill, moderate the relationship between creativity and idea implementation (Baer, 2012).

Therefore we conclude:

*Hypothesis 3: The relationship between innovativeness and job performance is moderated by political skill so that individuals with high levels of political skill and innovativeness score higher on job performance than individuals with high levels of innovativeness and low levels of political skill.*

Figure 4-1 depicts the hypotheses in the postulated moderated mediation model.

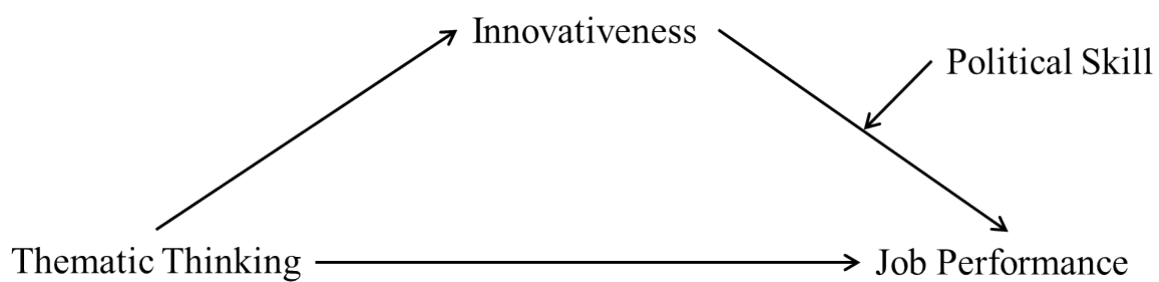


Figure 4-1: Illustration of the moderated mediation model postulated in the hypotheses.

## 4.4. Method

### 4.4.1. Sample and procedures

The study was conducted by administering an online questionnaire. The sample consisted entirely of employees in the R&D department of a multinational India-based IT service provider. Due to the diversity of the first languages within the sample (e.g., Hindi, Malayalam, and Urdu), and since all of the subjects use English as a business language and are fluent in English, all materials were presented in English. To tailor our research design to the Indian sample and check for the appropriateness of our measures in an intercultural context, we conducted a pretest with nine university-educated Indians between twenty and thirty years of age. Furthermore, to learn more about the working context of the subjects in our sample, we conducted nineteen qualitative interviews with R&D professionals working for the company, covering almost all job titles and levels within the R&D department.

The link to the survey was sent to the participants via e-mail, enclosed with a cover letter from the head of the department. The respondents' participation in this study was

strictly voluntary. 282 individuals accessed the survey and 172 completed the whole survey. 140 of the participants were male (81%), all had a university degree, and the average age was 32 years ( $SD = 4.88$ ) with an average organizational tenure of 5 years ( $SD = 4.10$ ).

#### 4.4.2. Measures

**Thematic thinking.** Thematic thinking was measured using forced choice word triads, which have been used in most studies concerned with thematic similarity (e.g., Froehlich & Hoegl, 2012; Golonka & Estes, 2009; Lin & Murphy, 2001; Simmons & Estes, 2008; Smiley & Brown, 1979). The measure used in the present study was previously used and published by Froehlich and Hoegl (2012). The main part (30 out of 40) of the triads were also used in prior studies by Lin and Murphy (2001) and Simmons and Estes (2008). Each word triad consisted of a base concept that was presented on top of a taxonomic and a thematic option (e.g., with jogging shoe as the base concept, hiking boot as the taxonomic option, and mp3 player as the thematic option). An illustration of a word triad as presented in the study is shown in Figure 4-2. All word triads used are provided in Table 3-1. The participants had to choose the concept that was *most similar* to the base concept. The positions of the taxonomic and thematic options (i.e., left or right) were randomized. The participants had to make their choice within five seconds. If they did not, the next triad was presented. In total, 40 triads were presented, with half of the triads displaying the taxonomic option on the left and the thematic option on the right and vice versa. At the beginning of the test, a sample item was presented together with the instructions. The sample triad was excluded from the analyses. To include the thematic thinking scores in the analyses, the thematic proportion, which is the percentage of the triads that were answered, with the thematic option was calculated (see Golonka & Estes, 2009; Simmons & Estes, 2008).

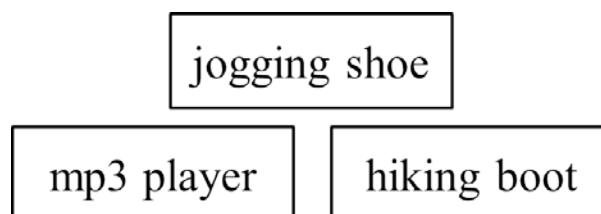


Figure 4-2: Illustration of word triad.

**Political skill.** Political skill was measured with thirteen items (Cronbach's Alpha = .88). The scale was adapted from the *political skill inventory* developed and validated by Ferris et al. (2005) and has been shown to be valid when self-ratings are used (Blickle, Below, & Johannsen, 2011a; Blickle et al., 2011b). The items were selected on the basis of whether they suited the purpose of the present study and were rated by the participants on a five-point Likert scale ranging from "strongly disagree" to "strongly agree". The items used in this scale are shown in Table 4-1.

**Innovativeness.** Innovativeness was measured with six items (Cronbach's Alpha = .74) that were each rated by the participants on a five-point Likert scale ranging from "strongly disagree" to "strongly agree". The scale was developed for the specific needs of the present study. The items were adapted from the innovation scale of the Kirton adaption-innovation inventory (Kirton, 1976) and chosen on the basis of considerations of content validity. All items of the scale are shown in Table 4-1.

**Job performance.** We measured job performance with five items adapted from a job performance scale developed by Blickle et al. (Blickle et al., 2008). The original scale comprised six items. Due to considerations of content validity for the sample, one item was excluded ("How sociable do you act in co-operation with others"); as in the interviews conducted prior to the survey, sociability and co-operation were not mentioned as being part of individual performance. The items were each rated on a five-point Likert scale with the following anchors: "much worse than other persons in a comparable position," "worse than other persons in a comparable position," "as good as other persons in a comparable position," "better than other persons in a comparable position", "a great deal better than other persons in a comparable position". The Cronbach's alpha of the scale was .80. All items of the scale are shown in Table 4-1.

Variable	Items
Political Skill (adapted from Ferris et al., 2005)	I spend a lot of time and effort at work networking with others. I am able to communicate easily and effectively with others. It is easy for me to develop good rapport with most people. I understand people very well. I am good at building relationships with influential people at work. I am particularly good at sensing the motivations and hidden agendas of others. At work, I know a lot of important people and am well connected. I spend a lot of time at work developing connections with others. I am good at getting people to like me. I try to show a genuine interest in other people. I am good at using my connections and network to make things happen at work. I have good intuition or savvy about how to present myself to others. I pay close attention to people's facial expressions.
Innovativeness (adapted from Kirton, 1976)	I have original ideas. I cope with several new ideas at the same time. I would sooner create than improve. I have fresh perspectives on old problems. I like to do things in an original way. I need the stimulation of frequent change.
Job Performance (adapted from Blickle et al., 2008)	How fast do you usually complete your tasks? How is the quality of your performance altogether? How successful are you in dealing with unforeseen and/or unexpected events (disturbances, interruptions, losses/deficiencies, crises, stagnations)? How well do you adjust yourself to changes and innovations? How reliably do you meet work-related commitments and agreements?

Table 4-1: Items used for the variables.

**Control variables.** Positive affect was used as a control variable because mood has been shown to influence cognition in general and thematic thinking in particular (Froehlich & Hoegl, 2012; Isen & Daubman, 1984; Isen et al., 1987; Shalley, Zhou, & Oldham, 2004). It was measured with a picture test developed by Lang (1980). The subscale valence, reflecting positive affect, was used in the analyses, as thematic thinking has been shown to be significantly positively related to positive mood (Froehlich & Hoegl, 2012). Seven pictures were presented to the participants. Each of these pictures represented an increasing level of negative respectively positive valence. The participants had to choose which picture reflected their present mood best.

Thematic thinking is positively related to age in adults (Froehlich & Hoegl, 2012; Smiley & Brown, 1979). Therefore, age was used as a control variable. Since most of the participants were male (male:  $N = 142$ ; female:  $N = 30$ ) and there were differences in the mean of thematic thinking in the sample, with women showing higher levels of thematic thinking, we controlled for gender. Table 4-2 shows the descriptive statistics and inter-correlations of all variables.

Variables	Mean	SD	1	2	3	4	5	6	7
1. Age	32.09	4.88							
2. Gender	.81	.39	.10						
3. Positive Affect	5.03	1.18	-.03	.03					
4. Thematic Thinking	63.83	19.05	-.11	-.06	.13				
5. Innovativeness	3.59	.58	.03	-.02	.21**	.21**	(.74)		
6. Job Performance	3.78	.59	.13	.11	.26**	.15*	.35**	(.80)	
7. Political Skill	3.55	.56	.08	-.07	.32**	.19*	.34**	.37**	(.88)

$N = 172$ ; \*\* =  $p \leq 0.01$ , two-tailed; \* =  $p \leq 0.05$ , two-tailed; † =  $p \leq 0.1$ , two-tailed;

For gender: 0 = female, 1 = male. Values in parentheses are reliability coefficients.

Table 4-2: Descriptive statistics and correlations.

## 4.5. Results

All hypotheses were tested using procedures based on regressions. The moderate correlations among the constructs and the results of the variance inflation factors indicate that the same method bias did not lead to severe problems in the present study. To test Hypothesis 1, we used hierarchical regression analysis. The control variables gender, age, and positive affect were entered in the first step, and thematic thinking was entered in the second step. The results of the regression analyses are shown in Table 4-3. Model 1 shows the relationships between the control variables gender, age, and positive affect and innovativeness. Model 2 was used to test Hypothesis 1—the relationship between thematic thinking and job performance. The results of the regression analysis support this hypothesis ( $\beta = .15$ ;  $p \leq .05$ ) by showing that thematic thinking explains a significant amount of the variance beyond the control variables.



Dependent Variable		
Job Performance		
Independent Variables	Model 1	Model 2
Gender	.09	.10
Age	.13 <sup>†</sup>	.14
Positive Affect	.26**	.24**
Thematic Thinking		.15*
R <sup>2</sup>	.09	.11
ΔR <sup>2</sup>	.09**	.02*
F	5.71	5.32

N = 172; \*\* =  $p \leq 0.01$ ; \* =  $p \leq 0.05$ ; <sup>†</sup> =  $p \leq 0.1$ , two-tailed;

*Table 4-3: Results of regression analyses.*

To test Hypothesis 2 and Hypothesis 3, we ran a moderated mediation model according to the procedures proposed by Hayes and colleagues (Hayes, 2012; Preacher, Rucker, & Hayes, 2007). The results are shown in Table 4-4. The results support Hypothesis 2—the mediation of the thematic thinking–performance relationship by innovativeness (Baron & Kenny, 1986): First, the independent variable, thematic thinking, shows a significant positive relationship with the mediator, innovativeness (Model 3:  $b = .01$ ;  $SE = .0023$ ;  $p < .01$ ). Second, there is a significant positive relationship between innovativeness and the dependent variable, job performance (Model 4:  $b = .25$ ;  $SE = .08$ ;  $p < .01$ ). Finally, the significant relationship between thematic thinking and job performance (Model 5:  $b = .09$ ;  $SE = .04$ ;  $p < .05$ ) is no longer significant when innovativeness is controlled for (Model 4:  $b = .00$ ;  $SE = .00$ ;  $p > .10$ ). We further ran a Sobel test to probe the statistical significance of the identified indirect effect. The Sobel test indicated the significance of the indirect effect of thematic thinking on job performance via innovativeness ( $p = .01$ ). The results failed, however, to support Hypothesis 3 that postulates that the relationship between innovativeness and job performance is moderated by political skill, showing no significant effect of the interaction term of political skill and innovativeness on job performance (Model 4:  $b = .08$ ;  $SE = .09$ ;  $p > .10$ ).

Independent Variables	Dependent Variables					
	Innovativeness		Job Performance			
	Model 3		Model 4		Model 5	
	B	SE	B	SE	B	SE
Constant	-1.04**	.38	2.81	.37	2.52**	.35
Gender	-.03	.11	.19	.10	.15	.11
Age	.01	.01	.01	.01	.02	.01
Positive Affect	.09	.04	.06	.04	.12**	.04
Thematic Thinking	.01**	.00	.00	.00	.09*	.04
Innovativeness			.25**	.08		
Political Skill			.21**	.08		
Thematic Thinking $\times$ Political Skill			.08	.09		
R <sup>2</sup>	.08		.24		.11	
F	3.72**		7.28**		5.32*	

N = 172; \*\* =  $p \leq 0.01$ ; \* =  $p \leq 0.05$ , two-tailed; b = unstandardized regression coefficient

Table 4-4: Results of moderated mediation analysis.

**Post-hoc analyses.** According to the literature on political skill and job performance, it would also be plausible that the relationship between thematic thinking and job performance is moderated by political skill. To see whether this alternative assumption better fits the data, we tested whether political skill moderates the relationship between thematic thinking and job performance, using hierarchical moderated multiple regression analysis (Cohen et al., 2003). The results of the regression analyses are shown in Table 4-5. The results support the assumption that the relationship between thematic thinking and job performance is moderated by political skill ( $F = 7.21$ ;  $R^2 = .21$ ;  $p < .01$ ). We entered the controls in the first step (Model 6), the direct effects of political skill ( $\beta = .30$ ;  $p < .01$ ) and thematic thinking ( $\beta = .10$ ;  $p > .10$ ) in the second step (Model 7), and the interaction term in the third and final step ( $\beta = .14$ ;  $\Delta R^2 = .02$ ;  $p < .05$ ) (Model 8). To further illustrate the significant interaction effect found in these analyses, we plotted the simple slopes of the interaction effect. The plots are shown in Figure 4-3. The plots and the simple slope analyses (West & Aiken, 1991) indicate a significant positive relationship for individuals with high political skill ( $b = .16$ ;  $t = 2.51$ ;  $p \leq .01$ ) and a non-significant relationship for those with low levels of political skill ( $b = -.02$ ;  $t = -.24$ ;  $p > .10$ ).

Dependent Variables			
Job performance			
Independent Variables	Model 6	Model 7	Model 8
Gender	.09	.12	.13
Age	.13	.11	.09
Positive Affect	.26**	.15*	.16*
Thematic Thinking		.10	.31**
Political Skill		.30**	.12
Thematic Thinking $\times$ Political Skill			.14*
R <sup>2</sup>	.09	.12	.12
$\Delta R^2$	.09**	.10**	.02*
F	5.71**	7.74**	7.21**

N = 172; \*\* =  $p \leq 0.01$ , two-tailed; \* =  $p \leq 0.05$ , two-tailed

Table 4-5: Results of post-hoc analyses.

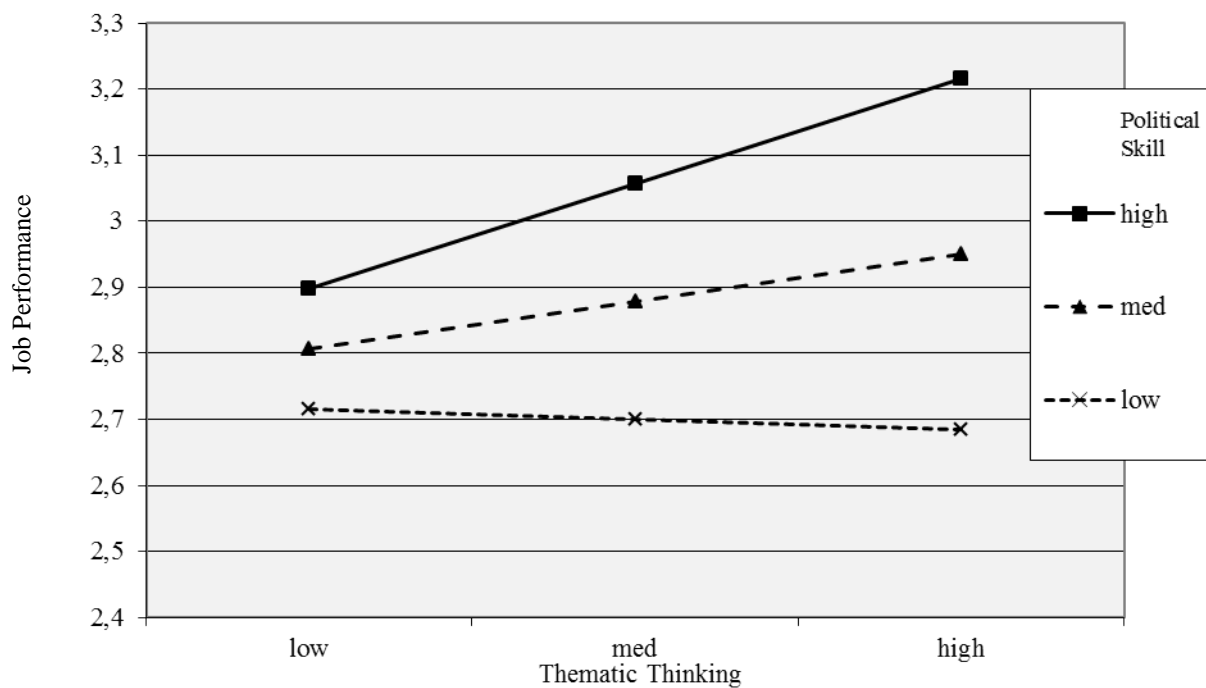


Figure 4-3: Illustration of interaction of thematic thinking and political skill.

## **4.6. Discussion**

The present study is the first to reveal a positive relationship between thematic thinking and innovative performance. The results indicate that thematic thinking has a direct positive effect on the innovativeness and job performance of R&D professionals, the latter being mediated by innovativeness. Furthermore, the post-hoc analyses indicate that political skill moderates the thematic thinking–job performance relationship. These results are an important step toward further establishing the concept of thematic thinking in the business literature.

### **4.6.1. Theoretical implications**

The results indicate that thematic thinking in a taxonomically dominated environment such as R&D is valuable to one of the most important performance indicators for R&D professionals, namely, innovativeness. This is especially interesting in light of prior studies in the field of thematic thinking. Froehlich and Hoegl (2012) proposed a positive relationship between thematic thinking and self-rated creativity. However, the results of their study showed a significant yet negative relationship. There are two possible explanations for these seemingly inconsistent results. First, the present study used a different measure. Froehlich and Hoegl (2012) measured creativity with a scale published by Shalley and colleagues (2009) focusing on creative outputs (e.g., “The work that I produce is novel.”), while in this study, the innovativeness scale was adapted from the Kirton adaption-innovation inventory (1976) focusing on innovative behavior (e.g., “I cope with several new ideas at the same time.”). There were several reasons for choosing this measure for the present study, and these might help to explain the diverging results. As Froehlich and Hoegl (2012) argued, individuals with a preference for thematic similarity and hence thematic ideas should be more used to this way of thinking, and therefore might judge their own ideas as less creative. This kind of judgment should have stronger effects on measures explicitly focusing on creative outputs, as used by Froehlich and Hoegl (2012) and no or a weak effect on measures focusing on behaviors, as used in the present study.

Second, and more importantly, Froehlich and Hoegl’s (2012) sample comprised individuals from a broad range of occupations, while that in the present study comprised only R&D professionals. It has been shown that cognitive styles or problem solving styles, which can be conceptually linked to thematic thinking, have to fit the specific environment in order to impact innovative performance (Amabile, 1983; Payne et al., 1990; Scott & Bruce, 1994).

Therefore, the results of the present study can be taken as further evidence for this proposition. As described above, the R&D environment is characterized by a young and highly educated workforce (e.g., Ball, 1998; Cha et al., 2009; Chang et al., 2008; Cordero et al., 1994), leading to a supposedly dominantly taxonomic way of thinking, with the generation of new and highly innovative ideas among its core tasks. All these aspects can be directly related to thematic thinking and to its relationship with individual performance, as shown in the present study. Hence, in different environments, different kinds of relationships can be expected. For example, when the strict adherence to rules is a key element of performance in a specific work environment, deviating from the common practice of idea generation by relying on thematic similarity is likely to have no positive effect on performance. Furthermore, in contexts where taxonomic logic is less dominant due to a less analytical focus or a differently structured workforce, thematic thinking might even represent common sense. Therefore, the results of such thinking processes would not be judged as being particularly novel, and hence thematic thinking would probably not be related to innovativeness.

The test of the hypothesized moderated mediation model did not support Hypothesis 3, which postulated that the innovativeness–job performance relationship is moderated by political skill. However, the post-hoc analysis showed a moderation effect for the relationship between thematic thinking and job performance. One reason for this might be that innovativeness explains different parts of the variance of job performance than thematic thinking does in the interaction between thematic thinking and political skill. Our results suggest that the effect of thematic thinking on job performance is two-fold: on the one hand, it fosters innovativeness, which, in turn, is directly related to job performance; on the other hand, deviating from the majority’s thinking style by possessing a preference for thematic similarity is likely to make it generally more difficult for R&D professionals to be perceived as high performing. Hence, it would be plausible that in regard to generating exceptionally novel ideas on the basis of thematic thinking is regarded as being positive, while deviating from the default style of thinking, that is, a taxonomic style, in other aspects can only be translated into higher performance through the use of political skill.

Thus, the present study also adds valuable insight to the literature on political skill. It is the first study to examine the moderating role of political skill in an individual differences–performance relationship in a non-Western sample. The results correspond with those reported by prior studies (e.g., Blickle et al., 2011b; Blickle et al., 2011d; Blickle, Wendel, &

Ferris, 2010; Ferris et al., 2008), indicating the cross-cultural validity of the concept and underlining its robustness. Furthermore, to our knowledge, this is the first study to examine the moderating role of political skill in an R&D context and to establish its link to innovative performance. So far, political skill has been mostly used either within samples comprising individuals from different job groups or in contexts where social interactions are thought of to be a key element of the occupational activities (e.g., sales representatives) (e.g., Blickle et al., 2011c; Blickle et al., 2012; Blickle et al., 2010). While innovation and creativity in organizations are gaining in importance, understanding organizational innovation is important to the management of R&D professionals as well as other groups of employees who are increasingly expected to show innovativeness in the workplace (Scott & Bruce, 1994). Therefore, disentangling the antecedents of such behavior is of high interest.

#### **4.6.2. Managerial implications**

Increasing the innovative performance of R&D professionals is of high managerial relevance. The results of the present study show that thematic thinking is positively linked to innovative performance. Individuals are generally capable of using both taxonomic and thematic similarity and can be trained to do so (Estes et al., 2011; Smiley & Brown, 1979). This implies that individuals working in highly taxonomically dominated fields, such as R&D, can be trained to also rely on thematic similarity, and that this should increase their innovative performance. Simply raising the awareness of different kinds of similarities and their potential benefits for innovation could begin to help employees more fully use their innovation potential.

Since our study is, to our knowledge, the first one to examine thematic thinking and individual performance indicators in a non-Western context, this adds impact to the results for two reasons. First, as the Indian economy is gaining momentum, India is also gaining importance as an innovation hub and R&D site (Altenburg, Schmitz, & Stamm, 2008; Asakawa & Som, 2008; Mashelkar, 2005). Investments in Indian R&D and science are increasing rapidly (Bound, 2007), and the most important input factor of Indian R&D is its human capital (Altenburg et al., 2008; Bound, 2007). The number of university graduates, especially in engineering, is rising (Altenburg et al., 2008) and many highly educated engineers and scientists study abroad and return to India and enter the job market (Bound, 2007). While in the past, China and India were of particular interest as locations for production, increasingly, multinational companies are carrying out other functions, especially

R&D, in these countries (Altenburg et al., 2008). Beyond being of interest as an off-shoring location, India is of relevance to the world economy and especially to present innovation leaders because Indian firms are catching up in terms of their innovation performance (Mashelkar, 2005). Despite the growing trend of foreign R&D in India, academic research in this field is still scarce (Asakawa & Som, 2008). One reason for this might be the assumption that R&D is the most universal function and therefore less affected by regional specificities (Asakawa & Som, 2008). However, research has indicated that this assumption must at least be treated with caution, as it has been shown that not only do basic cognitive processes show cultural differences (e.g., Allinson & Hayes, 2000; Choi, Nisbett, & Smith, 1997; Ji, Zhang, & Nisbett, 2004) but that there are also considerable East–West differences in the field of innovation (Calantone, Harmancioglu, & Droge, 2010). The present study contributes to this under-researched field by revealing a positive relationship between cognition, that is, thematic thinking, and individual performance in Indian R&D. The potential for innovation of this part of the workforce can and should be more fully exploited by enabling thematic thinking.

Furthermore, the present study underlines the importance of political skill for individual job performance. There are different approaches to apply this finding in practice. First, although the amount of variance of political skill is mostly based on dispositional factors, political skill is still to some extent trainable (Ferris et al., 2007). Hence, training or coaching could be used to enhance R&D professionals' political skill to improve their individual performances and career prospects. Second, from the perspective of companies, it would also appear worthwhile to enact measures to reduce the influence of political skill on innovation performance. One way to do this could be to implement anonymous electronic idea management systems, similar to idea suggestions systems, which might help to reduce the effects based on interpersonal ties between employees or to foster contributions from more introverted or junior employees (Fairbank & Williams, 2001). Of course, there are limits to this or related approaches; however, the functioning of an R&D department without social interactions seems improbable.

#### **4.6.3. Limitations and future research**

Despite the diligence exercised in conducting the study, there are several limitations that should be addressed in future research. First, the data used in the present study were collected mainly on the basis of self-assessments. However, one of the focal variables,

thematic thinking, was not based on self-reports but on individuals' test results; that is, this variable was measured in a way that completely differed from the Likert-type scales used to assess innovativeness, job performance, and political skill. Therefore, we do not expect any common-method bias for relationships including the thematic thinking variable. To test for common-method variance, we also used a procedure recommended by Lindell and Whitney (2001). We ran correlations for the focus variables of the study with a variable that was theoretically unrelated. We used agreeableness, which only showed a significant relationship with job performance, thus supporting the assumption that common-method variance was not of relevance in the present sample. Furthermore, we conducted the Harman one-factor test recommended by Podsakoff and colleagues (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Podsakoff & Organ, 1986), which led to more than one component, giving further evidence of the validity of the data. However, it would be a valuable contribution to examine the link between thematic thinking and performance indicators that are not based on self-reports. Performance indicators could be assessed by others, such as supervisors, and tested instead of rated (e.g., using an idea generation task), or objective measures, such as patents, promotions, or monetary bonuses, could be applied.

Another limitation of the present study is that only cross-sectional data were used; therefore, it is not possible to determine causality or the direction of the relationships. A longitudinal study would also be of interest to examine if and how thematic thinking among R&D professionals develops over time.

Finally, the sample of Indian R&D professionals used in the present study can be regarded as a strength and starting point for future research. We argue that this specific group of employees should show a low level of thematic thinking due to specific characteristics that have been shown to be negatively related to thematic thinking, namely, a young age and a high level of education (Estes et al., 2011; Froehlich & Hoegl, 2012; Simmons & Estes, 2008; Smiley & Brown, 1979). Furthermore, Allinson and Hayes (2000) conducted a study in which Indian managers showed a comparably low level of intuitive cognitive style, which is conceptually close to thematic thinking. Hence, it would be an important contribution to the research on thematic thinking to compare the levels of thematic thinking and their relationships to antecedents and outcomes across different cultures and occupations.



## 5 Idea selection in suggestion systems: A thematic similarity perspective<sup>3</sup>

### ABSTRACT

The literature on suggestion systems has focused on mainly the organizational aspects and individual characteristics of submitters. We take a different approach and focus on the idea itself. To differentiate these ideas, we build on recent research in cognition, which distinguishes two kinds of similarities: feature-based, taxonomic similarity and thematic similarity, which is based on the external relations of entities. We empirically test the relationships of idea character (“thematicness”) and idea presentation (scenario and experiential proximity) with idea evaluation. We identify significant, positive relationships for all characteristics with idea evaluations. Data were obtained from the suggestion system of the research and development (R&D) department of a multinational manufacturer of consumer goods. We discuss our findings in the context of bounded creativity approaches, derive theoretical and practical implications, and recommend avenues for future research.

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<sup>3</sup> This unpublished working paper was written by Julia K. Froehlich, based on conjoint work with Prof. Dr. Martin Hoegl and Prof. Dr. Michael Gibbert.

## 5.1. Introduction

Innovation is crucial to most companies (Bharadwaj & Menon, 2000; Cohen & Levinthal, 1990; Hitt, Ireland, & Lee, 2000; Tushman & Anderson, 1986). The so-called fuzzy front-end (FFE), which is the phase from the first consideration of an idea and the decision to take it to development (Kim & Wilemon, 2002), poses both risks and opportunities to companies. On the one hand, these very early stages can contribute directly to the success of a new product (Cooper, 1988, 1994). On the other hand, most companies do not seem to be very good at generating and evaluating ideas (Khurana & Rosenthal, 1998). A recent study by Booz & Company revealed that only 43% of participants thought that their efforts to generate new ideas were highly effective, and only 36% also judged the conversion of such ideas as highly effective (Jaruzelski, Loehr, & Homan, 2012). Furthermore, the study showed that clearly structuring the FFE of innovation is important for encouraging successful innovation. One way to standardize the FFE of idea generation and evaluation are formal idea suggestion systems (Van Dijk & Van Den Ende, 2002). While research has so far mainly focused on factors that influence the success of suggestion systems related to organizational structure and the submitters (see e.g. Fairbank & Williams, 2001; Leach, Stride, & Wood, 2006; Van Dijk & Van Den Ende, 2002), we focus on an alternative perspective: the idea itself.

Goldenberg et al. conducted research on the idea itself in the context of innovation (Goldenberg et al., 2001; Goldenberg & Mazursky, 1999; Goldenberg et al., 1999). Based on their analysis of highly successful innovations, they developed innovation templates for use in the generation of ideas. These innovation templates are built on operators (e.g., “linking” and “unlinking” entities within a concept) that can be combined in templates and be used to generate new ideas from existing concepts. The present study extends this approach to the field of suggestion systems by attempting to answer the following research question: How do the characteristics of an idea submitted to a suggestion system influence its evaluation within the company?

To answer this question we take a *thematic* perspective based on recent findings in cognitive psychology and consumer psychology (Estes et al., 2012; Estes et al., 2011; Froehlich & Hoegl, 2012). Our approach builds on a dual-process model of similarity perception that distinguishes between taxonomic, feature-based similarity and thematic, relation-based similarity (Estes, 2003; Wisniewski & Bassok, 1999). Estes, Gibbert, Guest,

and Mazursky (2012) found that, depending on the task, brand extensions based on a thematic idea were preferred over those based on a taxonomic idea. Extending such conceptual logic to a similarity-based perspective, we propose that the way ideas are assembled and presented influences how they are evaluated.

The present paper contributes to the literature in the following ways. First, we contribute to the emerging stream of literature on thematic thinking. This field of research stems from cognition research and has increasingly been used in the business literature (e.g. Estes et al., 2012; Froehlich & Hoegl, 2012; Gibbert & Hoegl, 2011). We build on the research by Estes et al. (2012) by investigating the relationship between thematic idea characteristics and evaluations. We contribute to the research in this field by applying the thematic perspective to ideas within suggestion systems and by using field data instead of experimental data.

Second, the idea itself and its influence on evaluations in suggestion systems is an under-researched field. Most studies focus on the individual and the organization, omitting an examination at the level of the idea. Our research builds on Goldenberg et al.'s innovation templates (Goldenberg et al., 2001; Goldenberg & Mazursky, 1999; Goldenberg et al., 1999). The innovation template approach can be classified as a bounded approach to creativity (Hoegl, Gibbert, & Mazursky, 2008). Bounded creativity approaches, as opposed to unbounded approaches, such as brainstorming, hold that it is not generating as many ideas as possible (as in the "out of the box" mindset) that leads to success but knowing what makes an idea valuable is the key to the effective and efficient generation of ideas. The present paper contributes to the literature by examining the characteristics of ideas that lead to improved, positive evaluations within suggestion systems.

The paper is structured as follows. We first review the literature on thematic ideation and thematic ideas. Based on this perspective, we then derive our hypotheses and test them using field data from the innovation suggestion system of a multinational manufacturer of consumer goods. The paper concludes with a discussion of the theoretical and managerial implications of the present study, its limitations, and avenues for future research.

## 5.2. Theory

Ideas can be characterized as thematic when they build on thematic similarity. Two entities are thematically similar if they co-occur or interact in time and space within a scenario or event (Estes et al., 2011; Golonka & Estes, 2009; Wisniewski & Bassok, 1999). Thus, thematic similarity relates to the external relations between entities. Similarity plays an important role in the generation of ideas (Froehlich & Hoegl, 2012). Ideas are in most cases new combinations of already existing concepts (Goldenberg et al., 1999; Hargadon, 2002). In order to know which concepts to combine, one has to perceive a certain degree of fit or congruence between them; similarity provides us with a new perspective on conceptualizing and measuring this fit. Applying different kinds of similarities when generating ideas presumably leads to different kinds of ideas, which in turn are likely to be evaluated differently.

The differences between thematic and taxonomic ideas can be illustrated by different types of brand extensions. Taxonomic brand extensions are defined by sharing “many of the brand’s core features by extending into similar product categories (e.g. adidas sandals, BMW motorcycles, Ivory shampoo)” (Estes et al., 2012:87). In contrast, thematic brand extensions are defined by breaking “out of the brand’s traditional category by extending to different product categories that are nevertheless connected through spatial, temporal, or functional relations (e.g. Adidas deodorant, Caterpillar shoes, Colgate toothbrush)” (Estes et al., 2012:88). In the example of Adidas, sandals are a taxonomic extension because the features of sandals are very similar to those of running shoes. In contrast to this feature-based fit, Adidas deodorant shares hardly any features with sports apparel or jogging shoes, but it is related to existing products through a sports theme; most people use deodorant directly before or after their workout. A theme such as this can be a basis for idea generation. Entities belonging to the same theme (i.e. interacting or complementing each other within the theme) are combined to generate a new product, or entities are added to the theme in order to solve problems or difficulties occurring within it.

Initially, scholars assumed that only small children refer to thematic relations when making similarity decisions (Blanchet et al., 2001; Lucariello et al., 1992; Lucariello & Nelson, 1985; Nelson & Nelson, 1990; Smiley & Brown, 1979). As such, very young children tend to prefer thematic similarity to taxonomic similarity (e.g. judging dogs as more similar to bones than to cats). In the “thematic-to-taxonomic shift,” children in pre-school and

elementary school move to a more taxonomic orientation, possibly because of education systems that emphasize feature-based categorization (Murphy, 2001; Nelson, 1977). Thus, older children and adults tend to rely less on thematic similarity but do not solely rely on taxonomic similarity (Lin & Murphy, 2001; Simmons & Estes, 2008). Recent research showed that adults also attend to thematic relations when assessing fit or similarities among entities (Golonka & Estes, 2009; Lin & Murphy, 2001; Simmons & Estes, 2008). In fact, adults are capable of processing and using both kinds of similarity when making decisions, even though individuals show differences in their preference for one or the other kind of similarity (Estes et al., 2011; Simmons & Estes, 2008; Smiley & Brown, 1979).

Based on the work by Estes et al. (Estes et al., 2012; Estes et al., 2011), we argue that thematic idea properties lead to different kinds of evaluations of ideas, depending not only on the individual preference for one or the other kind of similarity but also on the context of the judgment. The context of suggestion systems has characteristics that could be relevant to the appreciation of thematic ideas. One reason for implementing such systems is to conceive ideas that probably would not have been generated in the regular innovation process because they deviate too much from traditional paths (e.g. incremental improvement of already existing products) (Fairbank & Williams, 2001; Neyer, Bullinger, & Moeslein, 2009). A second reason is that particularly in the consumer goods industry, employees submitting to suggestion systems of innovation ideas still play expert roles (e.g. R&D professionals). However, at the same time they act as users, which makes it more likely that they would submit ideas that are derived from the context of usage (Franke, Von Hippel, & Schreier, 2006)). In this case, similarity is more closely related to a thematic than to a taxonomic logic.

### **5.3. Hypotheses**

Goldenberg et al. postulated that specific characteristics of ideas can be identified, which helps to generate successful ideas purposefully (Goldenberg et al., 2001; Goldenberg & Mazursky, 1999; Goldenberg et al., 1999). We argue that beyond the templates identified by Goldenberg et al., specific characteristics of ideas exist, which enhance the positive evaluation of innovation ideas. In the following sections, we develop our hypotheses postulating relationships between variables that can be framed in a thematic context and different facets of idea evaluations. Specifically, we differentiate between *idea character* and *idea presentation*.

### **5.3.1. Idea character**

We define idea character as the properties of an idea that can be linked to the way entities were combined to generate it. In the context of the present study, we frame taxonomic similarity and thematic similarity as the basis for identifying different idea characters. In their study on the evaluation of brand extensions, Estes et al. (2012) supported the assumption that the “thematicness” of an idea can be regarded as characteristic of an idea, which, as we argue below, influences idea evaluation.

Estes et al. (2012) showed that “top of mind,” and without further manipulation, thematic brand extensions are processed more rapidly, evaluated more positively, and judged less novel than taxonomic brand extensions are. However, when participants were asked to think of commonalities between the brand and the brand extension, taxonomic extensions were evaluated more positively and were judged as less novel. These results are surprising as it is generally assumed that close, taxonomically similar brand extensions are preferred over brand extensions that are distant and dissimilar. Hence, taxonomic ideas should be evaluated more positively than thematic ideas are (Estes et al., 2011; Gibbert & Hoegl, 2011).

In the present paper, we agree with the finding that thematic similarity improves evaluation. The specific context of our study—the corporate suggestion system—has important characteristics that should favor thematic ideas. First, to appreciate thematic ideas, one has to know the theme. As the results of Estes et al. (2012) suggested, even an intuitive idea, such as beer and crisps go well together, is enough to make a consumer appreciate a given theme instantly, boosting processing ease and hence evaluations. Notably, recent research has corroborated this by indicating that experts attend to thematic similarity more than novices do (Froehlich & Hoegl, 2012; Proffitt et al., 2000). Because our study uses data provided by a consumer goods manufacturer, not only do the evaluators know the strategy of the firm and its internal processes, they are also most likely to be consumers and therefore intimately familiar with the themes linking different products. Therefore, in a suggestion system where submitters and evaluators know the themes within which the products are used, thematic ideas should be evaluated more positively than taxonomic ideas are.

Second, Estes et al. (2012) found that asking participants to list commonalities between brands and brand extensions reduces the evaluation of thematic ideas. In our case, commonalities between ideas submitted to the suggestion system and already existing products of the company are clearly not in focus. By their very design, suggestion systems

capitalize on the immediate, top of mind idea without encumbering submitters with additional ruminations about commonalities with existing products (i.e., the top of mind condition in Estes et al.'s (2012 study).

Therefore, we posit the following:

*Hypothesis 1: Thematic ideas are evaluated more positively than taxonomic ideas are.*

### **5.3.2. Idea presentation**

We further we argue that not only the way an idea is assembled but also the way it is *presented* is part of the thematic perspective. In the following, we present two characteristics of presentation that are directly linked to thematic idea generation: “scenario” and “experiential proximity”. Despite their direct link to the way thematic ideas are derived, these characteristics can also be found in taxonomic ideas, and hence are not part of the idea character.

**Scenario.** Thematically similar entities are linked by a scenario or event, i.e. a theme (Estes et al., 2011; Wisniewski & Bassok, 1999). Scenarios and events are characterized by a sequence of actions leading to what we characterize as experiential flow. This flow helps to make sense out of situations and saves cognitive capacity (e.g. Gioia & Poole, 1984; Kahneman & Lovallo, 1993). Interruptions in this flow are irritating and take a great deal of cognitive effort to be understood. Take for example the scenario of “going to a restaurant” (which is also a script) (Schank & Abelson, 1977). A disruption in flow could mean that the waiter would bring the bill before taking the order. Furthermore, the description of the idea without referring to the sequence of actions would compound the misunderstanding.

Because scenarios and events are a core part of thematic ideas, it is more likely that thematic ideas, not taxonomic ideas would be presented in this way. In another example, the following idea description is framed as a scenario:

*I usually come home from work late in the evening. During the week, this is the only time for me to take care of household tasks. As the washing cycle of my washing machine takes more than one hour, I take care of the washing on weekends. But when I turn on the washing machine in the morning, I cannot leave for other activities because the washing becomes smelly if it is not taken out of the machine shortly after it is finished. It would be*

*great to have a detergent that keeps the washing fresh in the drum so that my plans do not have to depend on the washing cycle.*

The (thematic) idea is described within a scenario. However, a taxonomic idea could be framed and be presented in a highly experiential manner, too:

*I usually come home from work late in the evening. During the week, this is the only time for me to take care of household tasks. As the washing cycle of my washing machine takes more than one hour, I take care of the washing on weekends. But when I turn on the washing machine in the morning and take out the washing later, some stains are still present. It would be great to have a detergent that really removes all the stains.*

This example suggests that even though it is presented within a scenario, the idea is still based on taxonomic logic (“develop a detergent that removes all stains instead of most stains”). Therefore, we argue that framing an idea in a scenario is an aspect of idea presentation and not of idea character.

Given that thematic similarity is defined as two or more objects being externally related within a scenario or event (Estes et al., 2011; Wisniewski & Bassok, 1999), scenarios and events are an integral part of thematic relations and hence the assembly of thematic ideas. Describing scenarios or events—narrating the idea as if it were a story—within an idea concept should make it easier for evaluators to understand the line of argumentation and comprehend the relevance of the suggestion by the experiential flow. The argument for the positive effect of experiential flow is two-fold. First, scenarios can be used to fill in conceptual gaps and thus reduce uncertainty (Bless et al., 1996). New product development, especially in the early phases, is characterized by uncertainty (Bodensteiner, Gerloff, & Quick, 1989; Freel, 2005). Individuals strive to reduce this uncertainty using different kinds of strategies (Lipshitz & Strauss, 1997). To reduce uncertainty in ambiguous situations, gaps or blanks can be filled with knowledge based on prior experiences (Bless et al., 1996). New product ideas must be understood in order to be accepted, which is more likely when little cognitive effort is required to understand the product (Hirschman, 1980). Hence, difficulties in understanding the idea and an extremely high level of uncertainty would lead to fewer positive idea evaluations (Mueller et al., 2012). We argue that ideas presented within a scenario, such as a story, are less likely to receive unfavorable evaluations because of missing information, lack of understanding, or high cognitive effort required. This is in line with cognition research, which has shown that when choosing an idea, individuals prefer those



needing less cognitive effort to understand (Garbarino & Edell, 1997). A study by Estes et al. (2012) showed that positive evaluations can be linked to processing ease.

Furthermore, because the scenario shows how the idea could be applied, this idea would be evaluated more positively than others would be. The scenario demonstrates clearly how the product could be used and the kinds of practical problem it could solve. Likewise, if the application of a product and the context from which the idea is derived is described concretely, this would further indicate that the idea is more mature than an idea that is described in a very abstract way.

Therefore, we hypothesize the following:

*Hypothesis 2: Ideas providing a scenario are evaluated more positively than ideas that are not presented within a scenario.*

**Experiential Proximity.** Thematic thinking can be linked to personal experience (Froehlich & Hoegl, 2012; Proffitt et al., 2000). Of particular importance are deep insights into the themes, which can only be gained when the themes are directly experienced. Therefore, we regard a high level of *experiential proximity* as part of the thematic perspective on innovation ideas. We argue that based on the perspective from which it is described, experiential proximity is communicated within the idea. In the case of suggestion systems, ideas can be described according to three different perspectives: an impersonal perspective, a consumer perspective, and a first-person perspective. The latter example could also be presented from a consumer perspective, which could hint that the idea was derived from consumer insights:

*Our customers usually come home from work late in the evening. During the week, this is the only time for them to take care of household tasks. (...)*

Despite this link, we argue that experiential proximity is not part of idea character but of its presentation because no definite conclusion can be drawn from the mere presentation of an idea regarding the source of the idea (own experience, experience of others, or no experience). Furthermore, a taxonomic idea could also be built on personal experience (e.g., “*I don’t like persistent stains. I want all stains to be removed.*”).

We argue that experiential proximity, which is transported by the presentation of the idea within the suggestion system, is positively related to the evaluation of the idea and can

be operationalized by the perspective from which an idea is described. When derived from a theme, insights into one's actual actions (as a consumer of the product) or observations of the usage context are involved in the idea concept. Therefore, ideas should be evaluated more positively when the consumer insight is directly derived from the observation of consumer behavior or, preferably, from one's observations in using the product. This is in line with the assumptions made in Nonaka's (1994) theory of knowledge creation within organizations: Observation and interaction with others and combinations of existing knowledge are important, but direct experience is also needed to exploit fully the means of knowledge creation (Nonaka, 1994). These observations should be reflected in the presentation of the idea, that is, ideas that are derived thematically should be presented from either a first-person perspective ("I do the washing when I come home from work.") or from a consumer perspective ("Consumers do the washing when they come home from work."). When drawing from self-experience, it is more likely that the problem solved is perceived as relevant, because it should be more convincing than descriptions of other people's experiences. Furthermore, there is empirical evidence that self-referencing within narratives fosters persuasion (Escalas, 2007). Therefore, in the case of suggestion systems, direct observation should lead to better idea evaluations.

However, although it is closely linked to the thematic approach of idea generation, experiential proximity does not necessarily mean that an idea was derived from a theme and hence taxonomic ideas could be presented in a similar way. Therefore, the positive effect of experiential proximity should exist for ideas with a thematic as well as a taxonomic idea character.

Therefore, we hypothesize the following:

*Hypothesis 3: Ideas providing experiential proximity are evaluated more positively than ideas without experiential proximity.*

## **5.4. Method**

### **5.4.1. Data collection**

Including the ideas of employees in the innovation process should be even more attractive to firms that produce consumer goods than to other firms because in this case, employees are experts on the organization as well as its processes and brands. At the same time, they can take the customer perspective because they most probably are both consumers and employees (Neyer et al., 2009). In our research design, we used field data, that is, we analyzed innovation ideas submitted to the suggestion system of a multinational manufacturer of consumer goods, which was the sample in our study. As the dependent variable, we used actual evaluations given by innovation experts within the company. These were used in the sample company to decide whether an idea would be developed further and whether the submitter would receive a reward for his or her idea or not.

Of more than 46,000 employees, 1,500 employees working for the company were requested to enter innovation ideas to the system. The participating employees worked in the research and development (R&D) and marketing departments, which were closely linked in this firm. The ideas were evaluated by a pool of 270 evaluators that worked in management positions, either in R&D or in marketing. For the evaluation of each idea, a subset of 20 evaluators was selected.

We selected a subset from all the ideas submitted to this suggestion system. We excluded ideas that were submitted in idea competitions within the company. Our analysis of the system showed that during idea competitions, 919 ideas were submitted per month, in contrast to 69 per month when the system ran regularly. Furthermore, the ideas submitted during competitions received worse evaluations than ideas that were not submitted during competitions. Based on these facts, we argue that substantial differences in ideas and their related evaluations can be expected between “regular” and “competition” ideas. Therefore, all ideas submitted during idea competitions were excluded from our analyses. Some product areas were under- or over-represented within the suggestion system. Ideas belonging to one of these categories were also excluded because we expected that these ideas would potentially differ systematically from ideas related to the rest of the product categories.

Scholars have argued that cultural differences can be expected in thematic thinking (Estes et al., 2012; Estes et al., 2011). However, empirical insights into these differences are still lacking. We therefore decided to analyze only ideas that were submitted in the country of

the parent company (i.e., a Western European country) to control for cultural differences. These selection criteria led to a subset of 424 ideas and related evaluations.

Some ideas were incomplete or referred to attachments that were not part of the data set provided by the company. Another reason was that a language could not be coded. Based on these criteria, 36 ideas were excluded. When an identical idea was submitted several times, the first submission of it remained in the sample while all following submissions were excluded. This affected 10 ideas beyond the ideas excluded for other reasons, which resulted in a sample size of 378 ideas.

#### **5.4.2. Measures**

All independent variables, that is, idea character and idea presentation, used in our analyses were derived by coding based on content analysis of the ideas as they were described within the suggestion system (thematic vs. taxonomic, scenario, experiential proximity). Two trained coders coded all ideas. The coders were blind to the hypotheses of the study and had no access to the evaluations of the ideas. In preparation, the coders received written instructions and several training sessions. The overall agreement of the coders was 77%. This value is similar to the agreement reported by Estes et al. (2012: 91) with regard to the coding by two expert judges: “Inter-rater agreement between the two expert judges was 79%, where chance is 50%, and values around 80% are considered good.” If the coders did not agree on how to classify an idea, the lead author decided on the coding.

All dependent variables were taken directly from the suggestion system. The evaluators were required to provide a comment that justified their evaluation and give evaluations of five dimensions, all rated on a seven-point Likert-scale (from 1 = low to 7 = high). The dimensions comprised *market/sales potential*, *news value*, *relevance*, *feasibility*, and *logic of concept*. The mean of these ratings for all dimensions builds the basis for the company’s decision on whether the idea should be taken further in the innovation process. In our analyses, we use the mean evaluations (as an index across all dimensions) as well as the individual dimensions. Means, standard deviations, and correlations of all variables are shown in Table 5-1.

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Thematicness <sup>+</sup>	.81	.40										
2. Impersonal perspective <sup>+</sup>	.63	.48	-.05									
3. Consumer perspective <sup>+</sup>	.21	.41	-.02	-.69**								
4. First person perspective <sup>+</sup>	.15	.36	.09 <sup>†</sup>	-.56**	-.22**							
5. Scenario <sup>+</sup>	.56	.50	.18**	-.20**	-.05	.31**						
6. Mean evaluation	3.17	.44	.17**	-.14**	.01	.17**	.18**					
7. Market/sales potential	2.70	.51	.10*	-.14**	.07	.11*	.09	.81**				
8. News value	3.30	.74	.16**	-.13*	.04	.13*	.14**	.71**	.40**			
9. Relevance	3.20	.55	.16**	-.07	-.02	.12*	.15**	.86**	.73**	.39**		
10. Feasibility	3.65	.78	-.04	-.05	-.03	.11*	.11*	.17**	-.01	-.20**	.09	
11. Logic of concept	3.46	.56	.14**	-.02	-.11*	.15**	.19**	.81**	.57**	.44**	.71**	.38**

N = 378; \*\* =  $p \leq 0.01$ , two-tailed; \* =  $p \leq 0.05$ , two-tailed; <sup>†</sup> =  $p \leq 0.1$ , two-tailed; <sup>+</sup> = dummy-coded variable; 0 = no, 1 = yes

Table 5-1: Means, standard deviations, and correlations.

## 5.5. Results

The moderate positive correlations of scenario and experiential proximity with thematicness indicated that it is more likely for thematic ideas to be presented within a scenario and with high experiential proximity; yet that taxonomic ideas can be presented in way as well.

To test our hypotheses, we used multiple hierarchical regression analysis (Cohen et al., 2003). To test Hypothesis 3, experiential proximity was entered in the first step of the regression represented by dumm-coded variables for first-person perspective and consumer perspective. Impersonal perspective was represented by the combination of the dummies for consumer perspective (0 = no consumer perspective; 1 = consumer perspective) and *first-person* perspective (0 = no first-person perspective; 1 = first-person perspective) and was therefore omitted in the regressions. In the second step scenario was entered as a dummy variable (0 = no scenario; 1 = scenario) to test Hypothesis 2. To test Hypothesis 1, the dummy for thematicness (0 = taxonomic idea; 1 = thematic idea) was entered in the third and final step. The mean evaluations as well as all sub-dimensions of the evaluations were regressed on the antecedents. The results of the regressions analyses are shown in Table 5-2 and Table 5-3.

The results support Hypothesis 1 by showing that thematicness explains a significant amount of variance beyond scenario and experiential proximity in the mean evaluation (Model 3:  $\beta = .14$ ;  $\Delta R^2 = .02$ ;  $p < .01$ ). Significant effects are also shown in the evaluation dimensions *news value* (Model 9:  $\beta = .14$ ;  $\Delta R^2 = .02$ ;  $p < .01$ ), *relevance* (Model 12:  $\beta = .13$ ;  $\Delta R^2 = .02$ ;  $p < .01$ ), and *logic* (Model 18:  $\beta = .11$ ;  $\Delta R^2 = .01$ ;  $p < .05$ ). Hypothesis 2 is also supported by *scenario* explaining significant amounts of variance beyond experiential proximity in the mean evaluation (Model 2:  $\beta = .14$ ;  $\Delta R^2 = .02$ ;  $p < .01$ ), *relevance* (Model 11:  $\beta = .12$ ;  $\Delta R^2 = .01$ ;  $p < .05$ ), *logic* (Model 17:  $\beta = .16$ ;  $\Delta R^2 = .02$ ;  $p < .01$ ), and a marginally significant effect on *news value* (Model 8:  $\beta = .10$ ;  $\Delta R^2 = .01$ ;  $p < .10$ ). Finally, Hypothesis 3 is supported by the first-person perspective presentation (maximum experiential proximity), showing significant positive effects on mean evaluation (Model 1:  $\beta = .18$ ;  $\Delta R^2 = .03$ ;  $p < .01$ ), *market/sales potential* (Model 4:  $\beta = .13$ ;  $\Delta R^2 = .02$ ;  $p < .05$ ), *news value* (Model 7:  $\beta = .15$ ;  $\Delta R^2 = .02$ ;  $p < .01$ ), *relevance* (Model 10:  $\beta = .12$ ;  $\Delta R^2 = .02$ ;  $p < .05$ ), and *logic*

(Model 16:  $\beta = .13$ ;  $\Delta R^2 = .03$ ;  $p < .01$ ). However, only a marginally significant effect was shown on feasibility (Model 13:  $\beta = .10$ ;  $\Delta R^2 = .01$ ;  $p < .10$ ).

Independent Variables	Dependent Variables								
	Mean Evaluation				Market/Sales Potential				News Value
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Consumer Perspective <sup>+</sup>	.05	.05	.05	.10*	.10 <sup>†</sup>	.10 <sup>†</sup>	.07	.07	.07
First Person Perspective <sup>+</sup>	.18**	.14**	.13*	.13**	.11*	.11*	.15**	.11*	.11*
Scenario <sup>+</sup>		.14**	.12*		.05	.04		.10 <sup>†</sup>	.08
Thematicness <sup>+</sup>			.14**			.09 <sup>†</sup>			.14**
R <sup>2</sup>	.03	.05	.07	.02	.02	.03	.02	.03	.05
$\Delta R^2$	.03**	.02**	.02**	.02*	.00	.01	.02**	.01 <sup>†</sup>	.02**
F	6.28**	6.69**	7.03**	4.13*	3.08*	3.02*	4.30**	4.11**	5.00**

N = 378; \*\* =  $p \leq 0.01$ , two-tailed; \* =  $p \leq 0.05$ , two-tailed; <sup>†</sup> =  $p \leq 0.1$ , two-tailed; + = dummy-coded variable; 0 = no, 1 = yes;

Table 5-2: Results of regression analyses I.

Independent Variables	Dependent Variables											
	Relevance			Feasibility			Logic					
	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18			
Consumer Perspective <sup>+</sup>	.00	.00	.00	-.01	-.01	-.01	-.08 <sup>†</sup>	-.09 <sup>†</sup>	-.09 <sup>†</sup>			
First Person Perspective <sup>+</sup>	.12*	.08 <sup>†</sup>	.08	.10*	.08	.08	.13**	.08 <sup>†</sup>	.08 <sup>†</sup>			
Scenario <sup>+</sup>		.12*	.10 <sup>†</sup>		.08	.09 <sup>†</sup>		.16**	.14**			
Thematicness <sup>+</sup>			.13**		-.06				.11*			
R <sup>2</sup>	.02	.03	.05	.01	.02	.02	.03	.05	.06			
ΔR <sup>2</sup>	.02 <sup>†</sup>	.01*	.02**	.01 <sup>†</sup>	.01 <sup>†</sup>	.00	.03**	.02**	.01*			
F	2.78 <sup>†</sup>	3.62**	4.43**	2.14 <sup>†</sup>	2.20 <sup>†</sup>	1.98 <sup>†</sup>	5.68**	6.76**	6.23**			

N = 378; \*\* =  $p \leq 0.01$ , two-tailed; \* =  $p \leq 0.05$ , two-tailed; <sup>†</sup> =  $p \leq 0.1$ , two-tailed; + = dummy-coded variable; 0 = no, 1 = yes;

Table 5-3: Results of regression analyses II.



## **5.6. Discussion**

The present study is the first empirical investigation of a thematic perspective on idea evaluation. All hypotheses were supported empirically. Within a suggestion system, the idea character was significantly linked to overall evaluations as well as to several subcategories of organizational evaluations. Furthermore, the results showed that idea presentation plays an important role: scenario and experiential proximity were significantly related to a greater number of positive evaluations. The use of field data, including evaluation data that were basis of factual decisions within the company, underlines the relevance of the present study, thus further contributing to the research on thematic thinking in the management and innovation literature. The company from which the data were collected makes decisions on further development based on mean evaluations as they were used in the present study. All ideas reaching a minimum mean evaluation of 4.00 are kept in the process. Within the examined sample, thirteen ideas reached this cut-off value. All were thematic, five were presented from a first-person perspective (high experiential proximity), and ten were presented within a scenario. These descriptive results further supported that practical value can be captured when applying a thematic perspective.

### **5.6.1. Theoretical implications**

The present study makes two main theoretical contributions. First, we added important insights to the nascent field of thematic thinking. Second, we contributed to the literature on bounded creativity and innovation systems by focusing theoretically and empirically on the idea itself.

Scholars have argued that adults' concepts, especially in a business context, are dominated by taxonomic logic (Estes et al., 2012; Froehlich & Hoegl, 2012; Gibbert & Hoegl, 2011). Hence, one could expect that because of their deviation from the predominant logic, thematic ideas are evaluated less positively than taxonomic ideas are. The results of the present study showed that under specific circumstances, the opposite is the case, that is, thematic ideas receive better evaluations. This is in line with research by Estes et al. (2012), which showed that under certain conditions, thematic brand extensions are judged more novel or evaluated more positively than are taxonomic brand extensions. The present study contributes insights to this research by examining innovation ideas instead of brand extensions in a real-world organizational setting, and differentiates between idea character and idea presentation, thus providing a perspective of thematic thinking on both. The findings

show that thematic thinking can be framed as a multi-layered concept that is applicable and influential in different contexts. Another important finding of the present study is that thematicness, that is, idea character, explains a significant amount of variance *beyond* scenario and experiential proximity. This indicates that, with regard to the factors examined in the present study, the organizational evaluation of the idea depends more heavily on the character of an idea than on its mere presentation. This is of particular interest because in the present study, presentation and character are closely linked conceptually. Despite this close conceptual link, the results underline that within a thematic perspective of idea generation and evaluation, the differentiation between idea character and idea presentation is reasonable and necessary.

Besides contributing to the literature on thematic thinking, the present paper adds a new perspective on suggestion systems by showing that the idea itself is a fruitful research subject. Not only do we need to comprehend that both organizational and individual aspects in submitting to the system are important but also we need to understand how different kinds of ideas are evaluated. The present paper provides preliminary steps towards understanding how idea characteristics influence idea evaluations within suggestion systems.

To test our hypotheses, we focused on the mean evaluations of the ideas that were the basis of the companies' decisions whether to keep an idea within the innovation process or not. However, beyond the effects related to the mean evaluations, the relationships of the variables with the sub-dimensions of the evaluations were of interest and delivered important insights into how idea character and presentation influence idea evaluations. Thematicness showed the strongest relationships with news value, relevance, and logic. In particular, the relationship with news value is of interest because it is in line with prior research in the field of thematic thinking, which has postulated that assembling ideas thematically leads to extraordinary or novel ideas (Froehlich & Hoegl, 2012; Gibbert & Hoegl, 2011). Opposed to the findings of Estes et al. (2012) is that in the context of the present study, thematicness is positively related to both news value and overall evaluation. Estes et al. (2012) found that, depending on the experimental condition, thematic ideas are either judged more positively or perceived as being more novel, but not simultaneously. The results of the present study indicated that within an innovation context, novelty is closely linked to other evaluation dimensions, which might be because novelty or news value is perceived as more important or more positive within an innovation context than within the context of brand extensions (as in the study by Estes et al.).

The results supporting Hypotheses 2 and 3 indicated that the idea itself influences its evaluation within the organization based on not only its character but also its presentation. Most importantly, the results showed that even though the applied characteristics of idea presentation of experiential proximity and scenario are closely linked to thematic logic, taxonomic ideas also receive better evaluations when presented in that way.

Also in line with our argumentation is the significant effect on relevance in experiential proximity and scenario. The results can be interpreted as indicating that an idea that is described as a story from a first-person perspective can be understood more easily and therefore lead to more positive evaluations (Garbarino & Edell, 1997; Hirschman, 1980). Furthermore, the results showed a significant positive effect of scenario on relevance, underlining the argument that deriving an idea from a specific scenario and sharing this experience within the idea adds to its relevance. Interestingly, experiential proximity was also significantly related to sales potential. This result could be interpreted as indicating that if ideas are described from a first-person perspective, they imply that the submitter of the idea would buy the product her/himself and that evaluators would extrapolate this message to the customer base and therefore judge the idea as having a high market/sales potential.

### **5.6.2. Practical implications**

Beyond the theoretical implications, the present study has obvious practical implications. Most importantly, the present study has implications for bounded creativity approaches. In most cases, including the case of suggestion systems, the bigger challenge is not generating a sufficient number of ideas but rather choosing the right ideas (e.g. Jaruzelski et al., 2012; Rietzschel, Nijstad, & Stroebe, 2006; Rietzschel, Nijstad, & Stroebe, 2010). The results of the present study can be used to enable more efficient and effective idea generation. Furthermore, all the idea characteristics that were examined in the present study can be used intentionally to generate useful ideas.

In general, individuals are capable of processing taxonomic similarity as well as thematic similarity and can be easily instructed to do so (Estes et al., 2012; Estes et al., 2011; Smiley & Brown, 1979). Hence, it should also be feasible to train individuals to use themes to generate innovation ideas. However, in some situations, such as when a project aims at generating incremental innovation, it should also be possible and advisable to focus directly on taxonomic ideas.

Lastly, it should also be possible to teach or sensitize employees to the value of scenario and experiential proximity. This could be favorable for the quality of submitted ideas because the mode of presentation can be linked to idea character. Moreover, if an idea cannot be communicated in an appealing way, it will have implications for future development (customer reactions) and could indicate that the development was not linked closely enough to the usage context. If an organization decides that scenario and experiential proximity are important aspects, the development of such ideas could be fostered easily. For example, it is possible to screen submitted ideas for these characteristics. The submitted ideas then could go through a pre-selection stage. In the sample used in the present study, employees at the management level evaluated the ideas, which meant that the idea evaluation process required scarce resources, such as managerial time and availability. Some of these resources could be saved by pre-screening performed by lower-level employees, for example.

Simply fostering ideas that are presented in this way might be beneficial for improving idea quality but might tempt individuals to submit ideas that do not make sense beyond this scheme. A way of minimizing this issue could be not to promote explicitly this mode of idea presentation, but to promote the mechanism behind it. For example, employees could be encouraged to submit only ideas that they had derived from their personal experience with products that they would also buy themselves. However, the latter approach would be limited to firms producing products that the individuals who submit to the suggestion system potentially use and buy. However, measures building on Nonaka's theory of organizational knowledge creation (Nonaka, 1994) could be applied to minimize this issue. According to Nonaka's theory, different modes of knowledge creation can be applied to create new knowledge. The modes of socialization, externalization, and internalization could be used to help marketing and R&D professionals understand customers' themes in depth and then apply a thematic perspective. For example, this idea could be executed by sending these professionals directly to the customers to either observe the usage themes or, if possible, be an active part of them.

Furthermore, if an organization decides that the characteristics of an idea should not influence their evaluation it should be possible to identify their presentation characteristics and control for them when making decisions on their further development.

### **5.6.3. Limitations and future research**

Despite our efforts to conduct the present study with due diligence, some limitations are present. First, because the present study uses only cross-sectional data, we could not make statements on how the ideas would develop over time or lead to further steps within the innovation process. In future research, it would be interesting to follow ideas until they reached the market and compare their market performance with their early evaluation within the suggestion system. However, only a very small proportion of innovation ideas are brought to the market, and therefore the sample of ideas would be very small. Furthermore, over time factors of influence would accumulate, thus diluting the effects of the idea itself.

Second, it would have been valuable to examine the individual characteristics of the idea submitters and the evaluators. Previous research has identified inter-individual differences in thematic thinking preferences (Froehlich & Hoegl, 2012; Simmons & Estes, 2008). These differences could cause differences in the way ideas are generated and evaluated, that is, individuals with a stronger preference for thematic similarity should submit more thematic ideas and evaluate these ideas more positively than others would. Insights into these relationships could open up further avenues for the effective and efficient generation of ideas.

Third, the present study uses data collected from one single company. Even though we did not have any indication that this company was significantly different from others in the industry in terms of idea generation and innovation systems, this study is limited in that it cannot assure the broad generalizability of its results. In future research, it would be fruitful to validate the findings of the present paper using data gathered from other companies and other industries. However, because data on the front-end of innovation are difficult to obtain, there is a lack of such studies in the literature.

We are confident that the present research provides a good basis for necessary, further investigations of the idea-centered perspective on both innovation and thematic thinking.

## 6 How type of similarity affects decision making: Evidence from investor reactions to M&A announcements<sup>4</sup>

### ABSTRACT

Recent research in cognitive psychology highlights the existence of two different types of similarity: *taxonomic*, which is feature-based similarity, and *thematic*, which is based on external relations of entities. We apply this distinction of similarity to investor reactions to mergers and acquisition (M&A) announcements, and empirically test market reactions. We hypothesize that investor reactions to *taxonomic* deals are more positive directly after the announcement, and that it takes more time for investors to understand *thematic* deals. Our empirical investigations support this view. We observe, on average, positive announcement return for *taxonomic* deals, and negative for *thematic* deals. However, the negative announcement return for *thematic* deals reverses, on average, after three trading days, and seems to converge with the average announcement return for *taxonomic* deals. Further, we discuss theoretical and managerial implications and highlight avenues for future research.

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<sup>4</sup> This unpublished working paper was written by Julia K. Froehlich, based on conjoint work with Prof. Dr. Martin Hoegl, Jun.-Prof. Dr. Ingo Kleindienst, and Jun.-Prof. Dr. Denis Schweizer.

## 6.1. Introduction

Imagine that you are presented a table with three cups on it, one filled with milk, one with coffee, and one with lemonade, and you are asked a simple question: Which two among the three different contents – milk, coffee, and lemonade – would you judge to be most similar? How would you answer? While the question may seem simple, initially, it turns out that there is no obvious answer, and certainly not a straightforward one.

For sure, all three contents share some features. They are, for example, all liquids and they are all drinkable. Milk and lemonade share some additional features, such as being light in color and, typically, both are served chilled. Hence, speaking of the features shared, it seems that milk and lemonade are more similar to one another than to coffee. Then again, are not milk and coffee more similar to one another than to lemonade? After all, milk and coffee are often consumed together, and, as such, they are related via a consumption theme (Estes et al., 2011; Simmons & Estes, 2008; Wisniewski & Bassok, 1999).

Indeed, recent research in cognitive psychology highlights that different *types of similarity* exist: *taxonomic* similarity, which is feature-based, and *thematic* similarity, which is based on some external relations of the respective entities, that is, a shared theme (Estes, 2003; Estes et al., 2011; Golonka & Estes, 2009; Lin & Murphy, 2001; Simmons & Estes, 2008). While the importance of similarity judgments has long been recognized in the management literature, for example, in the context of strategy formulation (Farjoun & Lai, 1997), the fact that different types of similarity exist has not yet been considered.

With the present paper, we address this gap in the management literature. We explore how different types of similarity influence investor reactions to mergers and acquisition (M&A) announcements. Such M&A announcements pose extremely high information processing demands to investors analyzing and assessing the announced deal (Duhaime & Schwenk, 1985). As investors cannot process all information simultaneously, they are likely to rely on heuristics and cognitive simplification processes (Tversky & Kahneman, 1974). As Tversky and Kahneman (1974: 1124) have reasoned, these heuristics may at times be quite useful, “however, in some cases they can lead to severe and systematic errors.”

Our basic argument is illustrated in the following two examples. On January 19, 2010, the US food company Kraft announced that it would acquire Cadbury, the UK-listed chocolate maker, for more than \$19 billion. The strategic logic of this taxonomic M&A deal was directly obvious: the aim was to reach synergies and gain market share. As Douglas

McIntyre put it in a Wall Street blog: “The success of the deal is based on what most deals are: synergy.” Despite the concerns of the British public related to potential lay-offs, the initial reaction of investors was positive.

Seven months later, on August 19, 2010, Intel announced that it would acquire McAfee (Gibbert & Hoegl, 2011). Obviously, with Intel being active predominantly in activities classified under the Standard Industrial Classification (SIC) code 3674, which is for semiconductors and related devices, and McAfee being predominantly active in activities classified under the SIC code 7372, which is for prepackaged software, a taxonomic similarity was virtually nonexistent. Products, markets, and technology all substantially differed. Accordingly, investors’ assessments of the acquisition were initially predominantly negatively echoed in statements such as the one by Rob Ruff, “This acquisition makes ZERO sense. Consider it a hard sell signal.” or that by Peter Firstbrook, an analyst with Gartner Inc. in Stamford, “I’m baffled, I don’t see any synergy at all between McAfee and Intel.” Accordingly, reflecting investors’ initial negative assessments of the Intel-McAfee deal, Intel’s share price initially declined. However, once investors realized the thematic similarity between Intel and McAfee – the companies being related via the theme of security in electronic devices, in particular, internet-related ones –, they rectified their initial assessment of the deal, and Intel’s share price rebounded.

Building on insights from cognitive psychology, we argue that taxonomic thinking dominates the business context, and that investors are therefore biased toward taxonomic M&As. Conversely, investors are likely to initially misjudge the strategic logic of a thematic M&A deal, as a thematic logic for them is more complex to understand, as compared to the typical taxonomic M&A deal that largely centers on synergies. Accordingly, we argue that in the short run, investors will, on average, react more positively to the announcement of taxonomic M&A deals as opposed to the announcement of thematic M&A deals. Given that initial investor reactions may be biased or incomplete and thus lead to errors and decisions having to be rectified later (Oler, Harrison, & Allen, 2008), we also argue that as time goes by, more information becomes available and/or investors analyze the available information more deeply. As a result, investors are likely to become more familiar with the strategic logic of the thematic M&A deal and therefore reconsider their initial reaction to the announcement of the thematic M&A deal. Thus, we hypothesize that investors’ understanding of the thematic M&A deal will, on average, result in an alignment of their valuation of taxonomic and thematic deals in the long run.



Our intended contribution to the literature is as follows: First, we contribute to the emerging literature stream on *thematic thinking*. In particular, we introduce the idea that different types of similarity exist and that similarity judgments may be subject to cognitive biases. While some initial work has identified thematic similarity to influence the evaluation of brand extensions (Estes et al., 2012) or work-related individual differences (Froehlich & Hoegl, 2012), we are aware of no study that has theoretically and empirically focused on types of similarity in the context of companies' strategic actions. Given the prominent role of similarity in this context (Deephhouse, 1999) and the first promising results related to thematic thinking from other fields of research (see Estes et al., 2012; Froehlich & Hoegl, 2012), widening the scope of thematic thinking literature by providing evidence from the field of strategy makes an important contribution. The insights gained should be especially valuable in revealing the impact of thematic similarity on outcomes that are of relevance in business research as well as practice.

Second, focusing on investor reactions to M&A announcements, we also contribute to the literature by offering a new perspective on similarity within the context of M&A. Several studies have focused on the question of how similarity may be linked to investor reactions (e.g., Datta, 1991; Harrison et al., 1991). However, this stream of research is characterized by both differences in the definitions and measures of similarity and differences concerning the empirical results. The research aimed at identifying moderators to explain these heterogeneous outcomes has of yet failed to come to a satisfying solution (King, Dalton, Daily, & Covin, 2004). At the same time, scholars have called for research providing an adequate psychological foundation for strategy theory (Powell, Lovallo, & Fox, 2011). Therefore, we believe that adding a new, cognitive dimension to the similarity debate arguing that not only the *extent of similarity* but also the *type of similarity* may influence investor reactions to M&A announcements represents a valuable contribution to the literature.

## 6.2. Background

### 6.2.1. Types of Similarity

The concept of thematic similarity has been prevalent in cognition research for decades (e.g. Smiley & Brown, 1979). However, studies on thematic relations can mainly be found in the literature on children's development that assumes that young children tend to make decisions based on thematic similarity, while adults solely rely on taxonomic similarity (e.g. Gelman & Markman, 1986; Markman & Hutchinson, 1984; Waxman & Namy, 1997). More recent research, however, has qualified these assertions in showing that adults may also base their decisions on thematic similarity and that individuals differ in their respective preference for different types of similarity (Estes et al., 2011; Golonka & Estes, 2009; Lin & Murphy, 2001; Simmons & Estes, 2008).

*Thematic similarity* can be defined as one or more *external* (temporal, spatial, causal, or functional) relation(s) between any two entities that *complement* each other in an event or scenario (Estes et al., 2011; Golonka & Estes, 2009; Lin & Murphy, 2001; Wisniewski & Bassok, 1999). The key elements of this definition are “externality” and “complementarity” (Estes et al., 2011). These key elements conceptually distinguish thematic similarity from taxonomic similarity. Taxonomic similarity is based on sharing internal features, that is, within the respective concept. Owing to the sharing of features, the possibility of complementing each other is constrained for two taxonomically similar entities. Further, given taxonomically similar entities' constraints to complementing each other and to being externally related, thematically similar entities tend to be taxonomically dissimilar (Golonka & Estes, 2009; Lin & Murphy, 2001; Simmons & Estes, 2008; Wilkenfeld & Ward, 2001; Wisniewski, 1996; Wisniewski & Bassok, 1999; Wisniewski & Love, 1998).

A fitting example from the business context that may help to clarify what is meant by thematic similarity and how it is different from taxonomic similarity is provided by Gibbert and Mazursky (2009) in the context of hybrid products. The *Nike+ sport kit* by *Apple* and *Nike* combines two entities that are taxonomically very dissimilar, as they hardly share any features: jogging shoes and mp3 players. Notwithstanding the taxonomic dissimilarity of the two aforementioned entities, from a thematic point of view, they are highly similar, as they are related via the “jogging” theme: Individuals regularly listen to music while jogging. The *Nike+ sport kit* combines the two taxonomically different entities, jogging shoes and mp3 players, offering added value, for example, by displaying miles run on the display of the

iPod. Despite the apparent dissimilarity of the involved entities in terms of features, the Nike+ sport kit has been and remains to be a success for both companies highlighting the economic potential of thematic similarity (Froehlich & Hoegl, 2012).

Thematic and taxonomic similarity builds the basis for different kinds of inferences. Taxonomic categories help to store and retrieve category-based knowledge (Estes et al., 2011). While this kind of knowledge is primarily helpful in making assumptions about unknown or non-identical objects, thematic similarity helps to generate expectations about scenarios and events (Cohen & Basu, 1987; Estes et al., 2011; Moreau et al., 2001; Ross & Murphy, 1999). Accordingly, thematic similarity, or basing cognitive processes and their outcomes on thematic similarity (what we call thematic thinking), is not a substitute but rather a complement to taxonomic-similarity-based reasoning.

### **6.2.2. Similarity and M&A**

The concept of similarity has received a great deal of attention in the management literature (Deephouse, 1999). In particular, diversification and M&A research have focused on the antecedents and consequences of similarity among companies (Bausch & Pils, 2009; Palich, Cardinal, & Miller, 2000). The starting point for much of this research has been Rumelt's (1974) landmark study, in which he developed a taxonomy of nine diversification strategies distinguished by the concept of similarity across companies' businesses with regard to their products, markets, or technologies. The basic idea to classify companies based on their businesses' similarity across products, markets, or technologies was further reinforced by Montgomery's (1982), finding that Rumelt's (1974) taxonomy was highly correlated with continuous measures of diversification that are based on the SIC codes (Stimpert & Duhaime, 1997). Ever since, it has been common to evaluate the similarity between a company's different businesses by relying on the SIC codes of the respective businesses (Pehrsson, 2006; Stimpert & Duhaime, 1997). In doing so, researchers have restricted the assessment of similarity to the one implied by the SIC taxonomy and, as such, fostered an assessment of similarity based on features shared by the respective businesses. In other words, diversification and M&A research – and also teaching – have implicitly adopted a taxonomic similarity perspective at the expense of a thematic similarity perspective, when dealing with issues of similarity among companies.

Research has shown the importance of accurate similarity judgments (Farjoun & Lai, 1997). At the same time, scholars have also shown that decisions based on similarity

judgments are prone to biases and are more complex than one might expect (Porac & Thomas, 1990). This, however, may lead to costly wrong decisions (Tversky & Kahneman, 1974).

On the announcement day, two M&A deals – one taxonomic, the other thematic – may have the same risk and return profile, in terms of expected outcome and related variance. However, they may still significantly differ with respect to the likelihood of an *extreme outcome* – either for good or for ill. Given the prevalence of taxonomic-similarity-based thinking in the context of M&A, it is therefore likely that investors initially ascribe a higher uncertainty to thematic deals as opposed to taxonomic ones. As Epstein and Schneider (2008) have shown, when confronted with ambiguous information, investors take a worst-case assessment of quality. Given that investors are essentially unfamiliar with the strategic logic of thematic M&A deals, it is reasonable to assume that they will underestimate the value of the respective thematic M&A deal, and react accordingly.

### **6.3. Hypotheses**

Despite the ever increasing interest in M&A, empirical research on the determinants of investor reactions to M&A announcements remains inconclusive (Hitt, Harrison, Ireland, & Best, 2002; King et al., 2004). A frequently researched antecedent of investor reactions is the relatedness between acquirer and target (Barney, 1988; Finkelstein & Halebian, 2002; King et al., 2004), which is usually defined as resource or product-market similarity (King et al., 2004). According to Harrison, Hoskisson, and Ireland, acquisitions “represent an investment intended to create economic value through the development of synergies” (Harrison et al., 1991, p. 175). These synergies are thought to arise from similarities, thus further reinforcing the prevalence of taxonomic thinking in the context of M&A. Though empirical results remain inconclusive, the prevailing assumption is nonetheless that related deals – that is deals with high taxonomic similarity – building on the easy to grasp concept of synergy are more positively evaluated by investors as unrelated deals (Bausch & Pils, 2009; Singh & Montgomery, 1987).

Synergies are typically defined from a supply-side perspective and relate to the internal characteristics of the company (Ye, Priem, & Alshwer, 2011). Contrasting this traditional perspective, recent work by Priem and colleagues points to the strategic value of *demand-side synergies* (Priem, 2007; Ye et al., 2011). Such demand-side synergies may be found in a variety of businesses. A simple example is the combination of a coffee shop and a

bookstore, where customers can enjoy a coffee while browsing through books. Yet another example is given by General Motors selling cars and providing customers with convenient financing at the same time (Ye et al., 2011). This demand-side perspective is related but distinct from the thematic perspective on M&A that we take here, as thematic similarity is a broader concept applying to various other contexts outside, including interindividual differences in similarity perception (Estes et al., 2012; Estes et al., 2011; Froehlich & Hoegl, 2012; Gibbert & Hoegl, 2011; Simmons & Estes, 2008). However, both approaches have the proposition in common that value cannot only be created by synergies based on internal feature-based similarity, but also through the combination of external (thematically related) characteristics. This, however, is often ignored, as it does not fit the traditional understanding of similarity – or relatedness in the M&A context (Gibbert & Hoegl, 2011; Priem, 2007; Priem, Li, & Carr, 2012; Ye et al., 2011). This, in consequence, suggests that initial market reactions to taxonomic M&A deals should be more positive than to thematic M&A deals.

Further evidence for the dominance of taxonomically based thinking in decision making comes from the field of managerial cognition research focusing on mental models of managers and strategists. An influential example is the work by Porac and colleagues on mental models in the competitor definition of the Scottish knit wear industry (Kaplan, 2011; Porac & Thomas, 1990; Porac et al., 1989; Porac et al., 1995). Essentially, they found that managers define the industry based on a very distinct taxonomy based on characteristics of the firm (Porac et al., 1989). Similar results were reported by other scholars, such as Hodgkinson and Johnson (1994), who show that strategists map competition in taxonomies based on features. Interestingly, the mental organization of competition, industries, and markets in the form of hierarchical taxonomies based on features is hardly ever questioned. Building on these findings, we therefore argue that investors are biased in their evaluation of M&A announcements. In particular, we posit that investors are more receptive to M&A deals that are based on taxonomic similarity as opposed to those based on thematic similarity.

Further, investors are likely to possess characteristics that tend to foster decisions based on taxonomic similarity. As outlined above, research on similarity preferences has revealed the existence of inter-individual preferences for either taxonomic or thematic similarity (Dunham & Dunham, 1995; Estes et al., 2011; Froehlich & Hoegl, 2012; Lin & Murphy, 2001; Simmons & Estes, 2008). According to this research, formal education has been argued to be negatively related to thematic thinking (Estes et al., 2011; Froehlich & Hoegl, 2012). Essentially, knowledge structures taught in typical education systems are based

on abstract taxonomies. Accordingly, it is reasonable to assume that individuals who have spent a considerable time within such an education system are biased toward relying on taxonomically based thinking. Typically investors – at least institutional ones – have advanced university degrees in analytically driven subjects such as finance or economics. This, however, is likely to particularly foster a preference for abstract, taxonomic similarity over thematic similarity when making decisions.

In sum, given the prevalence of taxonomic similarity within the M&A field – in practice, research, and teaching – as well as the idiosyncratic characteristics of typical investors, we conclude:

*Hypothesis 1: Immediately after the announcement, investors will, on average, evaluate taxonomic M&A deals more positively than thematic M&A.*

As elaborated above, taxonomic similarity enables conceptually different inferences than thematic similarity does (Estes et al., 2011; Froehlich & Hoegl, 2012). Taxonomic similarity is especially valuable when facing objects that one has not encountered before. Conversely, thematic similarity is rather related to the interplay of taxonomically dissimilar entities. Hence, more experience is required in order to understand thematic similarity. In the literature on thematic thinking, it has been argued that the relationship between experience and thematic similarity is the reason why the tendency of adults to rely on thematic similarity is positively related to age (Froehlich & Hoegl, 2012).

Owing to the complexity of M&A deals, analyzing and assessing the announcement of an M&A deal poses extremely high information processing demands to investors (Duhaime & Schwenk, 1985; Zollo, 2009). To make an initial decision, investors are therefore likely to rely on external characteristics of the announced M&A deal, which can be compared to deals that they have encountered before (Haleblian & Finkelstein, 1999). Over time, however, more information on the deal becomes available to investors, and, at the same time, investors also have the possibility to analyze the available information more deeply, as they are no longer under pressure to make an initial decision. Having more information on the respective thematic M&A deal and devoting more time and resources to the analysis of extant information, investors are likely to understand the strategic logic of the thematic deal. Given this increased understanding, we expect investors to value the thematic logic of the deal and

to reconsider their initial reaction to the announcement of the thematic M&A deal. Therefore, we conclude:

*Hypothesis 2: Over time, investors will reassess their evaluation of thematic M&A deals in a way that, on average, the difference in valuation between taxonomic M&A and thematic M&A deals vanishes.*

## **6.4. Method**

### **6.4.1. Data collection and sample**

**Sample.** The basis of the sample is built on all M&A deals of publicly listed firms in the United States of America announced in 2010. The data come from several sources: The stock data originate from the Center for Research in Security Prices (CRSP) and the M&A data from the Securities Data Company's (SDC) Global New Issues Database. We require that (1) the acquirer is located in the USA, (2) the acquisition is completed, (3) the target company was acquired for a price above US\$ 50 million, and (4) that at least 50% is acquired. We obtain a total of 1,082 events that fulfill these criteria.

**Exclusion of deals.** We excluded all deals with acquirer and target having identical primary SIC codes to ensure the presence of both taxonomic and thematic deals (rather than just taxonomic deals, as manifested in completely identical SIC codes of both companies). We also excluded further sets of deals based on their primary SIC codes. These exclusions encompass deals where acquisitions are part of the core business of the acquirers. Examples for these kinds of deals are real estate investment trusts investing in the purchase of real estate. The SIC codes of the industries affected are listed in Table 6-1. Further, we require the acquirer to have valid stock price data in CRSP. Both conditions reduce our final sample size to 193.

SIC Code	Industries
6798	Real estate investment trusts
6799	Investors, not elsewhere classified
6211	Security brokers, dealers, and flotation companies
6719	Offices of holding companies not elsewhere classified
6726	Unit investment trusts, face-amount certificate offices, and closed-end management investment offices
6722	Management investment offices, open-end
1311	Crude petroleum and gas (Firms in this category are primarily engaged in oil and gas field properties. Mostly, deals are between two gas and oil fields, respectively. We exclude these deals owing to their focus on trading natural resources.)

Table 6-1: List of SIC codes that lead to the exclusion of a deal.

**Independent variables.** The independent focus variable in the present study is whether a deal is thematic, taxonomic, or neither thematic nor taxonomic. Two entities are thematically related if they show an external relation by co-occurring or interacting in space and time (Estes et al., 2011; Wisniewski & Bassok, 1999). This applies to M&A deals in the notion that when companies merge, two entities are combined in a new way. This combination can be based on different kinds of logic. As thematic logic, we define the combination of entities not based on the sharing of features but by being externally related by co-occurring or interacting in space and time. Hence, we look at what products or services are combined by the companies. The coding material was based on the press releases of the acquiring companies announcing the deals. The main source for these press releases was the homepages of the firms. When press releases were not available on the company's homepage, the related SEC-filing was used. Within the press releases, the argumentation of the board was used to codify the logic of the deal. This coding strategy has been chosen for several reasons. First, press releases differ greatly in their length. Therefore, coding the releases as a whole might lead to false positives in the coding as with an increase in the length of the release also, the probability of mentioning arguments related to the different coding categories might be inflated. Second, we consider the statement of the board to transport the core message the acquiring firm wants to get across to the market. We are left with 151



taxonomic and 42 thematic deals. All deals in the sample were coded by an expert coder who was blind to the performance outcomes of the coded deals.<sup>5</sup>

#### 6.4.2. Estimation of valuation effects

We measure acquirers' market reactions to the announcement of an M&A for classified thematic or taxonomic deals by calculating their abnormal returns around the announcement date. Following Brown and Warner's (1985) standard event study metric, which was, for instance, used by Halebian and Finkelstein (2002; 1999) and Hayward (2001), we apply the constant mean model to calculate the *cumulative abnormal returns*, as follows:<sup>6</sup>

$$CAR_{[t_0, t_0+\tau],i} = \sum_{t=t_0}^{\tau} (R_{i,t} - X_i),$$

where  $R_{i,t}$  is the return of firm  $i$  at time  $t$ , and  $X_i$  the firm's average daily stock return during the estimation period (120 days before the event until 20 days before the event). We use a standard t-test statistic to draw statistical inferences for the different event window *cumulative average abnormal returns* (CAARs).<sup>7</sup>

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<sup>5</sup> To validate the coding based on interpretation and to check the robustness of our definition of thematic and taxonomic deals, we additionally use a replicable coding system to classify deals based on indicators mentioned in the statements. As these categories are related to thematic and taxonomic logic but do not capture the concept as a whole, the derived classification is only used as a robustness check. We extracted six dimensions relevant to the discrimination between both kinds of logic, namely *integration*, *complementarity*, *demand-side value for thematic deals*, *shareholder value*, *similarity*, and *growth for taxonomic deals*. In every press release the statement of the board was identified and scanned for these six dimensions. If *integration*, *complementarity*, or *demand-side value* was mentioned in the press release as an aim or outcome of the merger, it was coded as "+1" for every aspect (or dimension), in case it was mentioned (indicating a thematic deal). If it was not mentioned, it was coded as "0." The other dimensions, *shareholder value*, *similarity*, and *growth*, are associated with a taxonomic logic. We coded as "-1" for every aspect (or dimension), in case it was mentioned (indicating a taxonomic deal); if it was not mentioned, it was coded as "0." The sum for the six dimensions can be interpreted as a score-index indicating whether the deal is more associated with "thematic" logic (positive score), unrelated (zero score), or more associated with "taxonomic" logic (negative score). We classify a deal as thematic if the score is larger or equal to one, and as taxonomic if the score is lower or equal minus one. We are left with 64 (55) taxonomic (thematic) deals and 74 unclassified, which had a score of zero. We see that the results show a similar pattern and are available upon request from the authors.

<sup>6</sup> We find that a similar pattern of results when we use the market model or a Fama and French (1993) three-factor model. This supports the statement by Brown and Warner (1985) that the simple mean returns model often yields results similar to those of more sophisticated models because the variance of abnormal returns is not reduced much by choosing a more sophisticated model. Tables are available upon request from the authors.

<sup>7</sup> We applied the test according to Böhmer et al. (1991) to capture possible event-induced increases in variance, the test according to Lyon et al. (1999) to control for the skewness bias, and the Wilcoxon rank sum z-score.

## 6.5. Results

The objective of our paper is to explore (1) whether, on average, investor reactions (= appraisal of an M&A deal's advantageousness) to the announcement of taxonomic M&A deals is different – in particular, more positive – from the reactions to the announcement of thematic M&A deals, and (2) whether and how investors reassess thematic deals over time.

Figure 6-1 clearly depicts that investors' initial reactions greatly differ according to the type of similarity the respective M&A deals are based on. Investor reactions toward taxonomic M&A deals are positive leading to an increase in CAAR, over the three trading days following the announcement of the deal, of about 1.37%. In contrast, investor reactions to thematic M&A deals are negative, resulting in a CAAR of -0.51% (see Table 6-2). These results provide support for our Hypothesis 1. When testing for statistical significance, we find that the CAARs are significantly positive over all event windows (except the [0; +1]) for taxonomic deals, which is robust for common t-values, the J-value, and the Wilcoxon's and the Böhmer's z-score. In comparison the CAARs of the thematic deals are not statistically different from zero for all event windows, which again supports Hypothesis 1. Finally, additional support for Hypothesis 1 comes from the test of difference provided in Table 6-3. The results indicate that there is a statistically significant difference between the CAAR of taxonomic and thematic deals for the event windows [0; +3] and [0; +5].

After the third trading day following the M&A announcement, it seems that investors reassess their initial deal valuation and appraise a higher advantageousness of thematic deals – CAAR increase and is close to zero on the fifth trading day (see Figure 6-1 and Table 6-2). In contrast, the CAAR for taxonomic deals increases steadily over time. When testing for the difference of the CAARs for taxonomic and thematic deals, we find a statistically significant higher stock appreciation for taxonomic compared to thematic deals up to the first five trading days (see Table 6-2). Thereafter the difference is no longer statistically significantly different from zero, which can be interpreted as a revaluation of thematic deals over time, and which supports our Hypothesis 2 (see Figure 6-1 and Table 6-3).

## How type of similarity affects decision making: Evidence from investor reactions to M&A announcements

Panel A: Taxonomic							
Event Window	Cumulative Average Abnormal Returns		Böhrer Test	t-Test	Johnson Test	Wilcoxon Signed Rank Test	Nobs
	Mean	Median	t-value	z-score	J-value	z-score	
[0; +1]	0.77%	0.30%	1.147	1.242	1.246	-1.116	151
[0; +3]	1.37%	0.47%	2.014**	2.021**	2.027**	-1.951*	151
[0; +5]	1.74%	1.10%	2.276**	2.443**	2.449**	-2.396**	151
[0; +10]	2.02%	1.75%	2.045**	2.302**	2.305**	-2.318**	151
[0; +15]	3.18%	2.86%	3.155***	3.395***	3.406***	-3.412***	151
[0; +20]	3.48%	3.00%	3.072***	3.358***	3.364***	-3.431***	151
[0; +25]	4.07%	2.96%	3.464***	3.742***	3.745***	-3.909***	151
[-10; +10]	2.65%	3.36%	2.215**	2.504**	2.506**	-2.500**	151
[-20; +20]	5.12%	4.58%	3.500***	3.745***	3.755***	-3.583***	151

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel B: Thematic							
Event Window	Cumulative Average Abnormal Returns		Böhrer Test	t-Test	Johnson Test	Wilcoxon Signed Rank Test	Nobs
	Mean	Median	t-value	z-score	J-value	z-score	
[0; +1]	-0.47%	0.09%	-0.785	-0.530	-0.533	-0.331	42
[0; +3]	-0.51%	0.37%	-0.797	-0.562	-0.565	-0.106	42
[0; +5]	-0.18%	0.95%	-0.397	-0.191	-0.193	-0.506	42
[0; +10]	1.13%	1.91%	0.813	0.881	0.882	-1.007	42
[0; +15]	1.16%	-0.01%	0.773	0.921	0.921	-0.731	42
[0; +20]	2.15%	2.78%	1.390	1.476	1.471	-1.557	42
[0; +25]	3.17%	4.19%	1.851*	1.925*	1.943*	-1.632	42
[-10; +10]	0.73%	-0.21%	0.487	0.440	0.438	-0.594	42
[-20; +20]	2.73%	2.95%	1.426	1.443	1.438	-1.607	42

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6-2: Cumulative average abnormal returns around M&A announcements.

This table reports the cumulative average abnormal returns for various event windows, the t-values, the J-value, and the Wilcoxon's and the Böhrer's z-score (Böhrer et al., 1991) associated with the cumulative average abnormal return and tested for statistical significance (constant mean model with estimation period from 120 trading days before the announcement until 20 days before). Panel A includes all M&A announcements for taxonomic deals (n = 151); Panel B includes thematic M&A announcements (n = 42).

Event Window	CAAR Taxonomic	CAAR Thematic	Test for Difference	
	Mean	Mean	Difference	P-value
[0; +1]	0.77%	-0.47%	1.24%	12.74%
[0; +3]	1.37%	-0.51%	1.88%*	7.11%
[0; +5]	1.74%	-0.18%	1.92%*	5.26%
[0; +10]	2.02%	1.13%	0.89%	28.46%
[0; +15]	3.18%	1.16%	2.02%	10.13%
[0; +20]	3.48%	2.15%	1.33%	23.05%
[0; +25]	4.07%	3.17%	0.90%	32.37%
[-10; +10]	2.65%	0.73%	1.92%	16.62%
[-20; +20]	5.12%	2.73%	2.39%	15.41%

\*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6-3: Test for difference.

This table reports a statistical test for differences between the CAARs of Panels A and B from Table 6-2 using t-tests for differences in means.

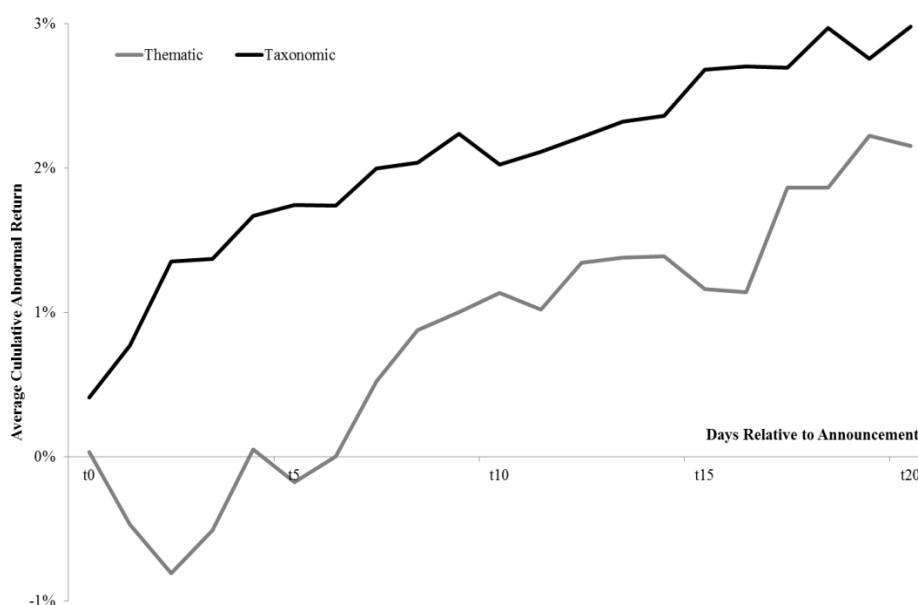


Figure 6-1: Cumulative average abnormal returns around M&A announcements.

The graph in Figure 6-1 illustrates the cumulative average abnormal returns of M&A announcements classified as taxonomic or thematic from day 0 (announcement day) through day +20 for a constant mean model with estimation period from 120 trading days before the announcement until 20 days before.

## **6.6. Discussion**

To the best of our knowledge, our study is the first to empirically examine consequences of thematic similarity on an organizational level. Our results indicate that, as expected, investors' immediate reactions to the announcement of M&A deals is biased toward those being based on taxonomic similarity. These are initially evaluated more positively as compared to those being based on thematic similarity. However, our results also reveal that as more information becomes available, respectively, the information available is analyzed more deeply, and investors reassess their evaluation of thematic M&A deals in a way that the difference in valuation between taxonomic and thematic M&A deals vanishes.

### **6.6.1. Theoretical implications**

Scholars in the field of thematic thinking have argued that Western thinking, especially in the business context, is dominated by a taxonomic perspective (Estes et al., 2011; Froehlich & Hoegl, 2012; Gibbert & Hoegl, 2011). The present study empirically supports this argument: not only by offering support for our hypotheses. In addition, descriptive indicators of the sample used indicate a dominance of taxonomic logic in the context of M&As. Even though we excluded all deals with acquirer and target having the same primary SIC code, more than three times as many taxonomic deals ( $N = 151$ ) compared to thematic deals ( $N = 42$ ) were identified within the sample.

This domination of taxonomic logic can be considered as the most important reason why taxonomic deals are initially better evaluated than thematic deals. Generally, really new ideas that deviate from what we have experienced and have accepted are evaluated more negatively than new ideas based on rather incremental changes (Mueller et al., 2012). The thematic deals examined in the present study can, by the traditional definition of the strategy literature, be classified as unrelated deals (Note: the inversion of the argument that all unrelated deals are thematic deals does not hold). However, when considering that different types of similarity exist, two companies are not unrelated; rather, they are related but in a different way. This might also explain why over time the evaluations of thematic deals turn positive. In order to understand such reasoning that is not in line with what is regarded as common sense, more information and time is needed. This finding supports research postulating that individuals are easily able to understand both kinds of similarity (Estes et al., 2011; Lin & Murphy, 2001; Smiley & Brown, 1979).

Research has shown that experts are more likely to attend to thematic relations when drawing inference than novices are (Proffitt et al., 2000). Hence, to understand a thematic relation, one has to be aware of its existence to understand and accept this kind of relation. It is not only important *how similar* two entities are but also *how they are similar*. The empirical evidence in this paper also supports the gradual information diffusion hypothesis by Hong and Stein (1999). Accordingly, investors may not be able to process all information immediately, nor is the entire information initially available. From this, however, it follows that as information gradually flows across investors, they may be forced to rectify their initial reaction later on.

The results of the present study underline the value that can be generated by applying insights from the field of cognitive psychology to strategy research. Scholars have called for the use of recent insights from the field of cognition to better understand decision making in the field of strategy, and to provide an adequate psychological grounding to strategy research (Powell et al., 2011). With the present paper, we have seized that call and taken a first step toward aligning M&A research and cognition research with regard to similarities.

#### **6.6.2. Managerial implications**

Beyond the theoretical contribution, the present paper also offers insights that are of relevance to managerial practice. It shows that the way an M&A deal is announced, in regard to the reasoning behind the deal, influences the way investors react to the deal. Hence, a taxonomic framing of the deal in the announcement can be expected to lead to a better initial evaluation by investors. In the course of the robustness check run, the deals were coded based on objective indicators related to a taxonomic logic and led to similar results compared to the binary expert coding of the deals. Therefore, if transporting a taxonomic logic is intended, explicitly mentioning indicators such as *similarity*, *growth*, and *shareholder value* can be used to get the intended message across. The same applies to thematic deals: attending to the indicators *demand-side value*, *complementarity*, and *integration* leads to similar market reactions as the expert coding.

The findings related to Hypothesis 2 show that the initial negative reactions of investors in the context of thematic M&A deals represent short-term assessments, only. We have argued that this change is based on more background information on the deal being available. Therefore, giving more information supporting the acceptance of the logic behind a thematic deal should be helpful to prevent negative market reactions.

Beyond the implication concerning M&A, the present study offers a more general implication to strategic decision-making. As Farjoun and Lai (1997) postulate, the adequate assessment of similarity is of high importance for strategic decisions as well in regard to identifying opportunities and threats. Research on thematic similarity has shown that the predominant taxonomic approach to assessing similarity is in human perception and should, in the business context, be supplemented by a taxonomic perspective (Estes et al., 2012; Estes et al., 2011; Froehlich & Hoegl, 2012; Gibbert & Hoegl, 2011). In order to use the full potential of similarity decisions to recognize threats and opportunities, both kinds of similarity should be taken into account (Gibbert & Hoegl, 2011). Adults are generally able to process taxonomic as well as thematic similarity and can be trained or primed to use thematic similarity (Estes et al., 2011; Smiley & Brown, 1979). Therefore, training or simply being aware of both kinds of similarity can help people to see the full picture of similarity, and to diminish blind spots when making decisions based on similarity.

### **6.6.3. Limitations & future research**

Despite all efforts and diligence, the present study has several limitations. First, the precise role of similarity perception in the decision process remains unsolved. The data at hand show that deals based on different kinds of similarity provoke different kinds of reactions, yet the question of how this reaction unfolds in practice cannot be answered. As large-scale field data (such as those used in the present study) cannot adequately answer such research questions, in-depth case studies would be needed. Next, the data show that after three trading days, the evaluation of thematic deals is reconsidered. The question of how exactly this time lag of three days comes about cannot be answered by the data at hand. Again, in-depth case studies may be a way to at least approximate an answer to this question.

Beyond addressing the aforementioned limitations, the present study opens up two main avenues for future research. First, the present study takes a cognitive perspective on market reactions focusing on the individuals evaluating the deals. Disentangling the antecedents of the decisions would valuably contribute to more fully understanding the drivers of such decisions. Individuals differ in their preference for different kinds of similarity (Simmons & Estes, 2008). Therefore, a promising avenue for future research would be to assess these differences and to test to what degree individuals with different similarity preferences differ in their evaluations and reactions to announced deals. Moreover,

experimental settings could help to identify specific characteristics within the announcements that lead to more positive or, respectively, more negative evaluations of the deals.

Second, our results seem promising for analyzing the implications of different kinds of similarity in various contexts. Estes and colleagues (2012) already revealed interesting relationships of thematic similarity and the evaluation of brand extensions. Their results indicate that depending on the judgment condition, thematic brand extensions can be evaluated as more novel or more positively as taxonomic brand extensions. Along these lines a wide range of fields for future research opens up. Potentially every field where assumptions related to the effects of similarity exist could also be a field for future research. One of these fields is strategic alliances. For those it could be interesting to disentangle the observable announcement returns in stock prices of both partners, beside the well-known effects that, for example, on average, the smaller partner has higher returns than the larger partner (see Chan, Kensinger, Keown, & Martin, 1997; Koh & Venkatraman, 1991).

Clearly, the present paper is but an initial attempt to explore how different types of similarity affect decision making. However, we believe that the issue of taxonomic and thematic similarity is important and worthy of further exploration. Therefore, we hope to see research in the future dedicated to the effects of different types of similarity.



## **7 General discussion**

### **7.1. Summary of empirical findings**

The results of the empirical analyses help to draw a more complete picture of thematic thinking within the business context. The findings of the dissertation underline the importance of considering thematic similarity within the context of managerial decision making by revealing significant relationships with highly relevant constructs in different contexts and at different levels.

First, the results show that experience and positive affect are significantly positively related to thematic thinking in terms of similarity preferences, indicating stable inter-individual differences and situation dependency at the same time. Furthermore, contrary to the hypothesized relationships, adaptation is shown to be positively related to thematic thinking, and creativity is shown to be negatively related.

The second study adds further insights on the individual level, yet in a different context: within the R&D context, thematic thinking is positively related to innovativeness and job performance, while the thematic thinking-job performance relationship is fully mediated by innovativeness. Post-hoc analyses reveal that the effect of thematic thinking on job performance for R&D professionals is two-fold: on the one hand, it is mediated by innovativeness, and on the other hand, it is moderated by political skill.

The other two studies add insights from a different level; they shed light on reactions to thematic ideas in different contexts. In Chapter 5, organizational evaluations of innovation ideas were examined by applying a thematic perspective to idea selection. The results show that within this context, ideas with a thematic idea character receive better evaluations than ideas with a taxonomic character. Furthermore, a thematic presentation of an idea, characterized by experiential proximity and scenario, is positively related to idea evaluation for thematic as well as taxonomic ideas. Contrary to these findings, the findings of the study presented in Chapter 6 show that thematically driven announcements of M&A deals receive initial negative reactions. Directly after the announcement of a deal, investors' average reactions to thematic deals are negative, while the reactions to taxonomic deals are positive. However, after three trading days, this gap vanishes.

Table 7-1 shows an overview of all hypotheses tested within the dissertation, along with the related outcomes.

Chapter and Hypothesis	Level	Dependent Variable	Result
<b>Chapter 3) Thematic Ideation – Antecedents and Outcomes of Individuals' Thematic Similarity Recognition</b>			
<i>Hypothesis 1:</i> Experience is positively related to thematic thinking.	Individual	Thematic thinking	✓
<i>Hypothesis 2:</i> Formal education is negatively related to thematic thinking.	Individual	Thematic thinking	✗
<i>Hypothesis 3:</i> Positive affect is positively related to thematic thinking.	Individual	Thematic Thinking	✓
<i>Hypothesis 4:</i> Thematic thinking is negatively related to adaptation.	Individual	Adaptation	✗
<i>Hypothesis 5:</i> Thematic thinking is positively related to creativity.	Individual	Creativity	✗
<b>Chapter 4) Thematic Thinking and Individual Performance in Research and Development</b>			
<i>Hypothesis 1:</i> Thematic thinking is positively related to job performance.	Individual	Innovative-ness	✓
<i>Hypothesis 2:</i> Innovativeness mediates the positive relationship of thematic thinking and job performance.	Individual	Job performance	✓
<i>Hypothesis 3:</i> The relationship of innovativeness and job performance is moderated by political skill, so that individuals with high levels of political skill and innovativeness score higher on job performance than individuals with high levels of innovativeness and low levels of political skill.	Individual	Job performance	✗
<i>Post-hoc Analyses:</i> The relationship between thematic thinking and job performance is moderated by political skill, so that individuals with high levels of political skill and thematic thinking score higher on job performance than individuals with high levels of thematic thinking and low levels of political skill.	Individual	Job performance	✓
<b>Chapter 5) Idea Selection in Suggestion Systems: A Thematic Similarity Perspective</b>			
<i>Hypothesis 1:</i> Thematic ideas are evaluated more positively than taxonomic ideas.	Innovation idea	Idea evaluation	✓
<i>Hypothesis 2:</i> Ideas providing a scenario are evaluated more positively than ideas that are not presented within a scenario.	Innovation idea	Idea evaluation	✓
<i>Hypothesis 3:</i> Ideas transporting experiential proximity, operationalized by an idea being presented from a first-person perspective, are evaluated more positively than ideas with a lower experiential proximity (consumer perspective, impersonal perspective).	Innovation idea	Idea evaluation	✓
<b>Chapter 6) How Type of Similarity Affects Decision Making: Evidence From Investor Reactions to M&amp;A Announcements</b>			
<i>Hypothesis 1:</i> Immediately after the announcement, taxonomic M&A deals are evaluated more positively than thematic M&A deals.	M&A deals	CAAR	✓
<i>Hypothesis 2:</i> Over time, investors reassess their evaluation of thematic M&A deals in a way that the difference in valuation between taxonomic M&A and thematic M&A deals vanishes.	M&A deals	CAAR	✓

✓ = supported; ✗ = not supported

Table 7-1: Overview of empirical results of the dissertation.

## **7.2. Theoretical implications**

The present dissertation set out to examine and conceptualize thematic thinking within the context of managerial decision making. Research on thematic thinking in the business context so far has posited that taxonomic similarity is dominating in this context (Estes et al., 2012; Gibbert & Hoegl, 2011). Gibbert and Hoegl (2011: 20), for example, put it this way: “Whether explicitly or implicitly, the traditional understanding of ‘similarity’ by managers has been a taxonomic one.” Propositions from different streams of management literature can be taken as evidence of the assumption that a taxonomic logic clearly dominates in the business context. While the taxonomic similarity of two entities (e.g., firms, strategies, brands) is often regarded as antecedent of positive outcomes, thematic similarity is hardly ever mentioned. Beyond the examples from the field of strategy discussed above, other examples exist in the field of marketing where, to name one example, it is assumed that brand fit is recommendable; i.e., taxonomic similarity of brand extensions and parent brand is recommendable (Aaker & Keller, 1990; Bijmolt et al., 1998; Park et al., 1991). Hence, it could be assumed that thematic thinking—if present at all—generally leads to negative reactions in the business context.

The present dissertation draws a more differentiated picture: the outcomes of thematic thinking differ depending on the context. The results show that while being negatively related to creativity in a sample comprising individuals from a broad range of occupations, thematic thinking was positively related to innovativeness in a more specific sample. On an idea level, it was shown that while reactions to thematic ideas in terms of M&A deals were initially negative and turned positive over time, thematic ideas received significantly better evaluations than taxonomic ideas did within an innovation idea suggestion system. All these findings are highly relevant, as they show that thematic similarities play an important role within the business context, even though they have hardly been explicitly considered thus far. Furthermore, taken together, the findings imply context dependency of thematic thinking on both levels that were examined.

### **7.2.1. Conceptualization and measurement of thematic thinking**

In order to generate knowledge or new ideas, existing knowledge has to be combined in new ways (Hargadon, 2002; Hargadon & Sutton, 1997; Nonaka, 1994). Thematic thinking supplements knowledge creation literature with a new perspective on how entities “go together” and can be sensibly combined for the purpose of creating new ideas. It can be

integrated smoothly with existing theory in innovation management. The knowledge brokering approach (Hargadon, 2002; Hargadon & Sutton, 1997), for example, promotes the idea that innovation arises from the new combination of existing knowledge. This core thesis is in line with the assumptions made in the present dissertation: existing entities from taxonomically dissimilar fields can be combined to form new ideas. Thematic thinking can also be linked to another knowledge creation theory. Nonaka's dynamic theory of organizational knowledge creation (Nonaka, 1994) postulates four knowledge creation modes: combination, socialization, externalization, and internalization. These modes are linked to two types of knowledge: tacit and explicit. Because it is closely linked to personal experience, knowledge about themes can be assumed to be mainly tacit knowledge. To take advantage of this knowledge and to share it, the externalization and socialization modes can be applied. One of the practical implications of this theory is that observation and active participation in processes (e.g., observing bakers and baking bread in order to develop a new bread-making machine) are important for acquiring knowledge and applying it to new ideas. From a thematic thinking viewpoint, this concept is supported from a supplementing perspective: observing and taking part means to explore thematic relations actively. If thematic knowledge already exists in an explicit form, or if it has been externalized, combination is also a way to create new thematic knowledge (i.e., thematic ideas).

Thematic thinking can also be placed in the context of the view of organizations as interpretation systems. In this view of organizations, it is assumed that they interpret events and information which, by definition, cannot be a fully "objective" process (Daft & Weick, 1984). Even though these interpretations depend on individuals, the interpretation of the organization is regarded as distinct from individual level perceptions (Daft & Weick, 1984). The results presented in the present dissertation fit well with this theoretical approach: similarity decisions are not objective, but based on interpretations. These interpretations depend on the individual who makes a decision and on the context in which the decision is made. The present dissertation did not explicitly examine decisions on the organizational level. However, the findings related to investor reactions to M&A deals, in particular, can be taken as indicators that similarity perceptions play a role in decisions on the organizational level and make it seem likely that organizations differ in the way they interpret similarity.

Beyond the theoretical conceptualization of thematic thinking, providing an adequate measurement for it is an important step toward establishing this concept in management research. Within the present thesis, two methods of measurement were used. When

examining thematic thinking on an idea level, content analysis (i.e., expert coding) was used to decide whether an idea could be classified as thematic. This method of identifying thematic ideas has also been used by Estes and colleagues (2012). Because two entities can be similar in different ways, to different extents, and on different levels, the coding of thematic ideas is highly complex. As such, a more objective way of assessing the thematicity of ideas is hardly feasible, especially when using field data. The results of the present study offer further evidence of the appropriateness of such measures: they indicate that thematicity can be perceived and measured. They do so by showing, for example, that in environments that are biased toward a taxonomic logic (M&A), fewer thematic ideas can be identified than in environments where thematic ideas are evaluated more positively (R&D). While most of the examined M&A deals were taxonomic and initially evaluated more positively by investors, more innovation ideas were thematic, and in this context, this type of idea was evaluated more positively.

In order to assess thematic thinking on the individual level in terms of thematic similarity preferences, a method that has been traditionally used in cognition research was adapted (e.g. Lin & Murphy, 2001; Simmons & Estes, 2008; Smiley & Brown, 1979). Word triads were used, which were mainly (30 out of 40) taken from a published work and partly developed for use in the present dissertation with regard to association strength. Despite the pretest showing different results for these two groups of items, robustness checks run with the data from the field studies in Chapters 4 and 5 showed the same pattern of results for all groups of items. This shows that even though the mean thematic proportion is affected by different items and instructions, the relationships with other variables remain stable.

A further indicator of the robustness and appropriateness of the measure can be gained by comparing the results of the different samples. The student sample in the pre-study showed the lowest level of thematic thinking, followed by the R&D professionals, and the mixed-occupation sample showed the overall strongest preference for thematic similarity. This finding is in line with theoretically based assumptions that predict the lowest levels of thematic thinking for young adults and a negative relationship with institutional education (Estes et al., 2011; Simmons & Estes, 2008; Smiley & Brown, 1979).

### **7.2.2. Antecedents and outcomes of thematic thinking**

The results of the statistical tests of the hypotheses within the different studies already deliver important insights. Beyond that, the combination of the studies and their results allow for even more differentiated assumptions related to thematic thinking as a concept.

The results show that environmental and situational factors influence thematic thinking. Thematic thinking is closely linked, conceptually, to cognitive styles. In the cognitive styles literature, it is argued that the link between cognitive styles and performance indicators depends on external conditions (Payne et al., 1990; Sagiv et al., 2010; Scott & Bruce, 1994). In different contexts, different cognitive styles enhance or hinder performance. This is in line with the results of the present dissertation, which shows that the thematic thinking–performance link is dependent on the context.

The effect of environmental factors on the relationships between thematic thinking and outcome variables is two-fold. First, under certain conditions, thematic thinking might not play a role, as there is no room for it due to the nature of the task: in environments where new ideas of any kind do not play a role and tasks are designed for incumbents to follow a narrow set of rules (i.e., independent decision making is not part of it), thematic thinking should have no or even a negative effect on work outcomes. The results of the empirical analysis support this assumption by showing that in the context of R&D, where new and creative ideas are of high importance, thematic ideas, specifically in the context of suggestions systems, are prevalent and evaluated positively, and thematic thinking is linked to individual performance. Second, in environments where there is room for thematic thinking, it might nevertheless simply not be welcome (see Chapter 6). In the latter type of context, it is likely that if thematic ideas come up, they receive more negative evaluations than taxonomic ideas do. On the individual level, this means that individuals with a strong preference for thematic thinking are not found very often in this type of context, and if they are, they receive more negative performance evaluations than individuals with a more taxonomic preference do. These two effects are likely to reinforce each other: individuals with a thematic preference experience that their ideas are not evaluated positively, and therefore, they might leave the context or learn to think in a more taxonomic way, which both enhances the dominance of taxonomic logic and further reduces the prevalence of thematic ideas. As examined in the study in Chapter 6, the M&A context can be regarded as such a context. Even though there is room for thematic ideas, and after a time lag, there is no

difference between their evaluations and those of taxonomic deals, these ideas only represent a small percentage of the entirety of deals, and initially receive more negative evaluations than taxonomic deals do.

### **7.2.3.      Relevance of thematic thinking in the business context**

To establish a new concept within the business literature, its relevance has to be demonstrated. The present dissertation does so by using conceptual work, as well as empirical insights. Taken together, the insights and theoretical foundations of the present dissertation can be used to frame thematic similarity as a basis for complementarity, and as such, conceptually underline its relevance in the business context.

Scholars typically suggest that two goods complement each other when, in the consumers' perception, one product is necessary for the use or performance of the other product (Samu, Krishnan, & Smith, 1999). Correspondingly, complementors are defined as companies from whom customers buy complementary products or to whom suppliers sell complementary resources (Brandenburger & Nalebuff, 1995). Because complementarity is a key element in thematic similarity (Estes et al., 2011), I argue that recognizing that two entities are featurally dissimilar but thematically related builds the basis of complementarity. In the following, I conceptualize a process model of complementarity emergence via thematic similarity. The model can be applied not only to complementarity, but also to the generation of thematic ideas in a more general sense. It is closely linked conceptually to the coding of ideas applied in the studies presented in Chapters 5 and 6.

Notably, most of the research on complementarity actually focuses on supply-side complementarities, such as complementarities stemming from resources for developing, manufacturing, or marketing products. In a significant departure from this tradition, recent work by Priem and colleagues points to the strategic value of demand- (and not supply-) side complementarities (Priem, 2007; Ye et al., 2011). Thematic thinking can help channel the search efforts so that this type of future complementarity can be revealed.

The process model presented in Figure 7-1 for detecting (demand-side) complementarity is composed of two main parts, each consisting of two sub-parts. As detailed below, I regard initial thematic ideas as the basis for future complementarity. The left side of the model reflects the generation of the thematic idea, which builds the basis for complementarity. As such, thematic relations between entities are identified, while operators transform this collection of entities into an idea. The right side of the model denotes the

outcomes of the idea. Complementarity stands as the unifying dependent variable of the model, ultimately resulting from customers' perceptions regarding significant improvements and genuine benefits of new products or services.

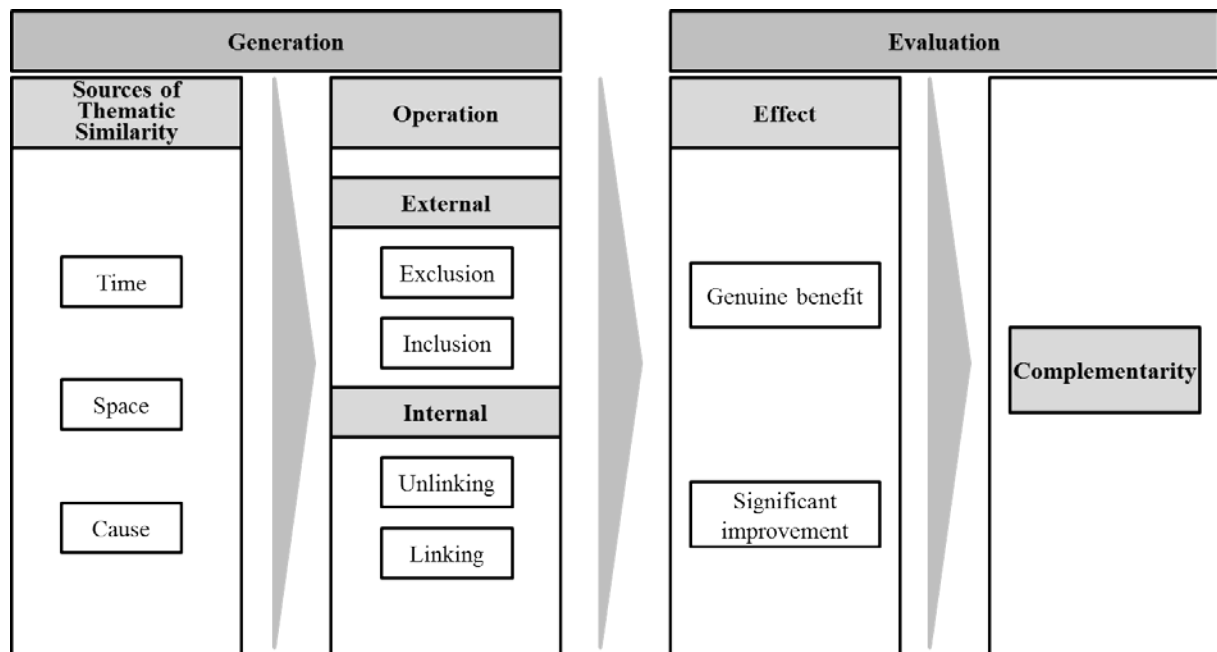


Figure 7-1: A process model of complementarity.<sup>8</sup>

**Sources of thematic similarity.** The first step of the model is concerned with the source of thematic similarity, which can be built on different grounds. Lin and Murphy (2001) list four forms of thematic relations. From their perspective, thematic relations can be spatial, functional, causal, or temporal. These categories are neither exhaustive nor exclusive. Two entities can be related via several sources. For instance, chalk and blackboard are related via time, space, and interaction within the theme “writing on a blackboard.” In this theme, both entities occur at the same time. Chalk is usually found beside blackboards and is used to write on them, and the goal of communicating via writing on the blackboard cannot, in the common understanding, be accomplished without one of the two entities. Therefore, chalk and blackboard show loadings on several dimensions of thematic similarity.

<sup>8</sup> The model presented in Figure 7-1 was developed, and the related text was written, by Julia K. Froehlich, and is based on conjoint work with Prof. Dr. Martin Hoegl and Prof. Dr. Michael Gibbert. A previous version containing parts of the work presented here was presented at the Annual Meeting of the Academy of Management 2011, in San Antonio, Texas.



Estes and colleagues (Estes et al., 2011) list slightly different typical forms of thematic relations: spatial (e.g., jungle and bird), temporal (e.g., summer and holiday), causal (e.g., wind and erosion), functional (e.g., fork and knife), possessive (e.g., police and badge), and productive (e.g., cow and milk) relations. Here as well, categories are neither exhaustive nor exclusive. Taking a closer look at these categories reveals reasons for this overlap. For example, entities that show a functional relation most probably will also interact in space and time in some way. In order to keep the model parsimonious, the sources of thematic relations were reduced to the most basic ones. Therefore, in the present model, the following sources of thematic similarity are included: *time*, *space*, and *cause*. Just as most ideas contain different aspects of relatedness, most thematic relations are based on several sources of thematic similarity, but to different extents.

*Time* can contribute to thematic similarity in several ways. Two (or more) entities can simply co-occur in time, or they can be part of a given sequence. *Space* can contribute to thematic relations in a similar way as time. Two (or more) entities can co-occur in space (object A tends, in some way, to be close to object B) or be spatially related. If this relation is stable, it can take any form that can be named by a local preposition, such as over, under, in front of, and behind. A USB cup warmer is a good example of how two entities, completely unassociated but related via time and space, can be integrated into one idea in a sensible way. Coffee cups are very often found in proximity to USB flash drives, so they regularly occur at the same time and space, and therefore, are related via space and time. USB devices and coffee cups show no taxonomic similarity, but they are related by a “working in the office theme,” where one problem might be the decrease in temperature over time of the coffee consumed while working. This problem can be resolved by integrating the USB slot of the computer and the coffee cup via a device that heats the coffee using energy provided by the computer.

A *causally* based thematic relation exists if one entity leads to the other. An example given by Lin and Murphy (2001) is the relation between electricity and a glowing light bulb, as the electricity causes the light bulb to glow. Causal relations can be expected to occur less frequently than spatial and temporal relations do. In the example of the “working in the office” theme, there is no causal relation between coffee cup and USB flash drive. However, after their thematic integration by the innovation idea, there is: the USB flash drive causes the coffee cup to heat up, which results in a causally driven thematic relation.

**Operation.** The next step in the model is the analysis of operators. From a product ideation perspective, the identification of a theme and its constituent entities offers the opportunity to introduce changes (i.e., operations) to the theme as the key element of thematic ideation. The operators proposed were adapted from Goldenberg and Mazursky (1999), who used them as the basis for their innovation templates. They proposed the following six operators: exclusion, inclusion, unlinking, linking, splitting, and joining. In the present model, the operators relate to the change that is required within a theme to generate a new idea. The operators used in the process model are partly similar, but were reduced to four (exclusion, inclusion, unlinking, and linking). Furthermore, they are classified as either external or internal. The external operators, *inclusion* and *exclusion*, relate to operations that affect the limits of the theme by either eliminating an entity (exclusion) or by adding an entity to the theme that was not part of it before (inclusion). The operators labeled as internal are *linking* and *unlinking*. They connect respectively disconnect entities within a theme, thus generating a new idea. Figure 7-2 illustrates the application of the operators.

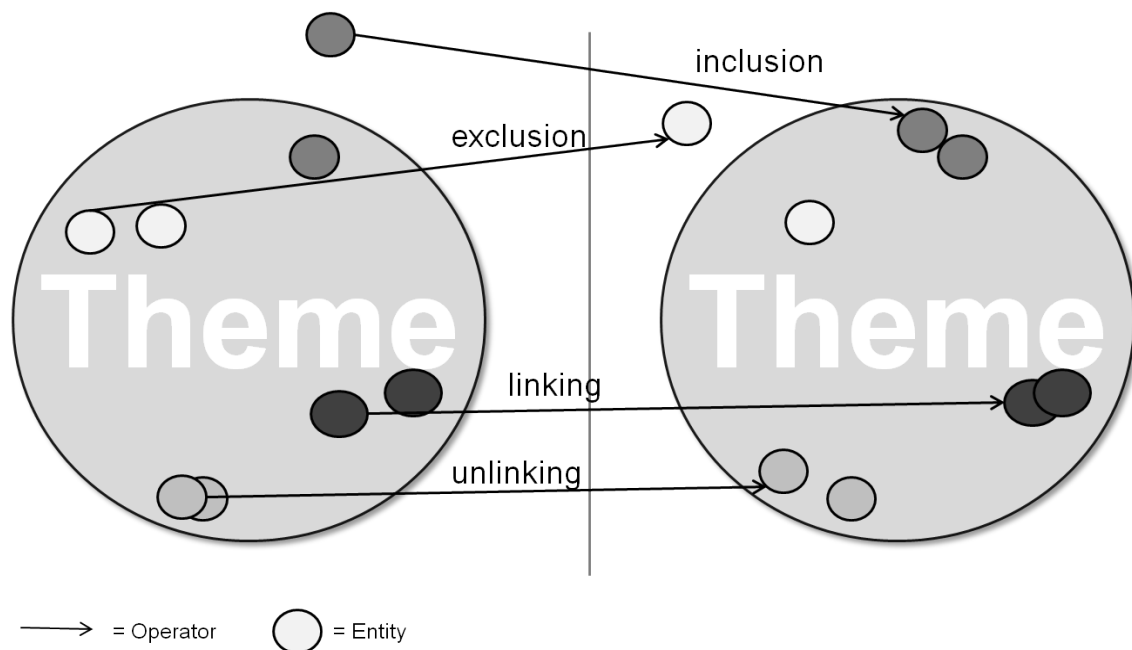


Figure 7-2: Operators in the process model of complementarity.

An example that demonstrates the possibilities of linking and that takes into account future challenges is a shower that can be supplied with capsules that apply sunscreen directly while showering. Today, the thematic link between showering and applying sunscreen is not

very tight, but it might be in the year 2050, as climate conditions might change in a way that makes daily application of sunscreen necessary.

To summarize, perceiving the (thematic) similarity between two entities is not enough to generate a new idea; the two entities need an operator to connect them functionally in some way. Once the common ground between two seemingly dissimilar things is established and their interaction can be described by various operators, the next step is the evaluation of the outcome of thematic thinking (i.e., the thematic idea).

**Evaluation.** The right side of the model shown in Figure 7-1 relates to the evaluation of thematic ideas. The evaluation is subdivided into direct and long-term outcomes. The direct outcome (effect) relates to the purpose or the benefit that is generated by the idea. The model aims at developing successful complementarities; hence, only ideas that offer a *genuine benefit* or a *significant improvement* are considered. Of course, thematic ideas might offer neither a genuine benefit nor a significant improvement. These ideas are not considered within the model, as they most probably will not make sense from a business perspective and will not lead to new perceived complementarities.

**Effect.** A *significant improvement* is generated if the outcome of the idea creates an output that is already known and can be achieved by already existing means. The main focus of the idea or product stays the same, but it is improved. An example of a thematically related product combination that falls into the category of significant improvement is the sunscreen that is applied using the shower. Still, the main result is that the user takes a shower and has his or her sunscreen applied, but the processes are improved significantly via their combination by making them more convenient.

A *genuine benefit* is offered if the combination of the entities in question creates a benefit that was not provided before. For example, the linkage of jogging shoes and an iPod for the Nike+ allows it to record miles run, pace, etc., which cannot be achieved without the integration of the entities.

**Complementarity.** Entities that are thematically related via a theme complement each other by “completing” the theme. In the example of the USB coffee cup warmer, where a “working in the office theme” has been applied, the USB flash drive and the coffee cup are related via the theme. I see complementarity as the outcome of thematic integration. Hence, complementary goods will be thematically related, but not every group of thematically similar products will be perceived as complementing each other. If USB flash drives and

coffee cups are regarded one day as strategic complements, one could assume that the USB cup warmer led to this, and therefore, thematic relatedness can be regarded as an antecedent of complementarity. This strategic outcome of thematic ideation is relevant for a long-term perspective on thematic ideas. It takes time for two entities to be perceived as complementary. From a strategic perspective, this makes thematic ideas attractive: future complementarities may be discovered before they are common sense. This links complementarity to association. Entities that have not been associated before but are part of a newly discovered demand-side complementarity may experience an increase in association strength. Yet, this increase in association strength will only affect the population involved with the theme (e.g., customers), and not the overall association strength.

The conceptual model presented frames thematic similarity as the basis for complementarity, and by doing so, helps to link this nascent concept to an established one. In terms of the high level of abstractness associated with thematic similarity as a concept, this is an important step in its conceptualization. It also helps to draw a line between thematic similarity and thematic thinking. While the one is essentially based on the other, both concepts are closely related, yet not identical. The concept of thematic thinking can be used to describe the process of revealing complementarities, while thematic similarity is an antecedent of it.

Furthermore, the theoretical model not only has implications for placing thematic thinking in the context of managerial decisions, but it also addresses an important gap in the complementarities literature. While there has been a lot of research on the outcomes of complementarities, the antecedents and the emergence of complementarities have been neglected (Ennen & Richter, 2010). Therefore, this is an important step toward conceptualizing the identification of complementarities. Moreover, scholars engaged in research of the so-called “demand-side perspective” have developed a new perspective on inter-industry diversification, taking into account not only synergies that are valuable to the firm, but also increasing utility for customers (Priem et al., 2012). Research from this field “looks downstream from the focal firm, toward product markets and consumers, to explain and predict those managerial decisions that increase value creation within a value system” (Priem et al., 2012: 346). The model integrates well with this stream of literature and contributes to it by showing how consumer value can be created by using thematic thinking. As such, the conceptual arguments developed provide an important theoretical underpinning for the recently emerging demand-side perspective. Specifically, the thematic thinking model

details how such demand-side complementarities can be identified, thus adding to existing work on the demand-side perspective that illustrates the commercial significance of this view.

Beyond conceptually showing the relevance of thematic similarity, the present dissertation does so by providing empirical evidence: it shows how thematic thinking is linked to performance indicators. In doing so, an important research gap in this nascent field of research is addressed. Thus far, Estes and colleagues (2012) have provided the only study examining empirical evidence for the impact of thematic similarity in the business context. The present dissertation goes beyond this insight, by showing that within the context of R&D, relationships exist with performance indicators on an individual level. Further, the studies presented in Chapters 5 and 6 show that the thematicity of an idea, in terms of innovation ideas or M&A deals, is significantly related to “real-world” managerial decisions (stock market reactions and decisions on taking ideas to the next level of the new product development process). Thus, the present dissertation takes an important step toward establishing the relevance of thematic similarity in managerial decision making.

### **7.3. Practical implications**

The results reported in the present dissertation underline the practical relevance of thematic thinking. Scholars have argued that thematic thinking is easily understood and apprehended (Estes et al., 2011; Smiley & Brown, 1979). All of the four studies presented underline the practical relevance of thematic thinking and discuss its application in business practice. However, none of the studies by itself offers instruction on how exactly thematic ideas can be revealed or generated. In the following, I develop concrete instructions on how to use thematic thinking in business practice, based on the findings and conceptual work presented in the thesis.

The finding that recognizing or knowing the theme is crucial for thematic thinking highlights the importance of customer focus. Customer-focused innovation approaches, such as the lead user approach (Franke et al., 2006; Herstatt & von Hippel, 1992; Lilien, Morrison, Searls, Sonnack, & Von Hippel, 2002; Lüthje & Herstatt, 2004; von Hippel, 1986; Von Hippel & Katz, 2002), have gained attention from scholars, as well as from practitioners. Hence, the idea of using customer input for new product development is not new. However, thematic thinking can be used to offer a new perspective on customer-oriented innovation (ideation in a more general sense) and to explain why customers’ insights, especially those of lead users, are highly valuable: a user of a given product or service is part of the theme, and

therefore, is an expert on which entities belong to the theme and which do not. This expertise can be used to find connections (or later, complementarities) that cannot be detected without knowledge of the usage context. One problem with customer-driven innovation is that customers cannot typically foresee future needs or usage contexts. Lead users are defined as being ahead of other users (von Hippel, 1986), but there are still contexts where this approach is not farsighted enough, or is simply not applicable. In such situations, thematic thinking may be a way of crossing this border. Explicitly searching for themes and then using the entities involved for creating new products or business ideas offers insights that go beyond the experiences of lead users. Even lead users are not aware of every entity belonging to a theme, and hence, the opportunities it offers. Furthermore, a new thematic idea might offer value to customers who have not been attracted by a specific product yet.

The themes have to be explored from an inside perspective (i.e., the consumers' perspective), but still, as a whole, the theme is highly important. Simply asking consumers what they think, want, or need probably will not be enough: because we are looking for things to be part of one theme that at the same time are not associated, consumers will not be aware of most thematic combinations when asked. Therefore, the first step in applying thematic thinking for detecting new business opportunities, or thus far not identified demand-side complementarities, is to discover a theme that is relevant to the target customer. The next step is to identify the entities involved and combine them in a new, purposeful way. The thematic approach to idea generation and complementarity detection can be of high practical value. If managers use thematic similarity as a basis for idea generation, it might help them be the first to discover a new complementarity, thus providing a strategic advantage.

In order to use the steps of the conceptual model presented in Figure 7-1 to develop ideas or reveal complementarities, tools need to be developed that help to identify themes and relevant thematic perspectives. In the following section, I provide practical advice on how to identify entities that build the basis for thematic ideation.

### **7.3.1. Thematic perspectives**

It can be argued that experience is positively related to thematic thinking (see Chapter 3). This positive relation is supposedly based on the fact that in order to use themes, they have to be understood and should be experienced by oneself. This type of relationship has important implications for the generation of thematic ideas: without knowing the theme, it is not possible to generate thematic ideas. Within an organizational context, different

perspectives exist, which ideally should be combined to generate successful thematic ideas. Based on the findings presented in Chapter 5, it can be argued that thematic ideas become more valuable when at least two perspectives are available (in this case, customer and management). Five perspectives can be identified as being relevant to thematic ideation: customers, non-customers, experts, managers, and cooperation partners. Figure 7-3 illustrates and summarizes these five perspectives, along with related goals for applying thematic thinking in these groups.

Obviously, the customer perspective is highly relevant to the application of thematic thinking (Gibbert & Hoegl, 2011). Individuals already using and buying a company's product are familiar with the themes related to the product; however, they have a different focus than the company has. Customers aim at their own perceived benefit, and most likely do not care about supply-side synergies and other aspects related to the firm's strategy and processes (Shocker et al., 2004). The goal when applying thematic thinking in business practice for this perspective is to retain these customers, e.g., by discouraging them from leaving the "product universe" of the company.





	 Focus	 See	 Blind to	 Thematic Goal
<b>Customers</b>	Maximize Personal Benefit	Usage Theme; Other Products	Corporate Strategy and Processes	Raise loyalty
<b>Non-Customers</b>	Maximize Personal Benefit	Other Products and Themes	Benefit of Product	Acquire
<b>Experts</b>	Technologies, Products	Potential of Technologies	Customer Themes	Experience Themes
<b>Managers</b>	Processes, Competition	Supply Side Synergies	Customer Themes	Realize Demand Side Synergies
<b>Cooperation - partners</b>	Own Products and Customers	Potential of Own Products	Customer Themes	Realize Demand Side Synergies

Figure 7-3: Relevant perspectives for thematic ideation.

Besides customers, there is another important usage perspective: non-customers. Retaining customers is important, but so is winning new ones (Thomas, 2001). Thematic thinking can be used to reach individuals who did not see the benefit of the product before. To see the full picture, it is important to know why people do *not* buy the product. The goal of a thematic approach related to this group is to discover barriers based on themes or themes that are important to this group, with whom the firm's products could also be of value.

The supply-side perspective is needed in addition to the demand-side perspective, in order to gain a full picture. Within the company, two groups have to be distinguished: experts and managers. Experts, such as research and development professionals, have an interesting angle on the products, as they know what is feasible with already existing technology and how it could be further developed (see also Chapters 4 and 5). However, their perspective often has a blind spot regarding customer themes. Experts often want to exploit the technology and build the most sophisticated product possible, but the customers simply might not be interested in it (Markides, 2006). They need to experience the themes in which the products are used, so that they become able to adopt a customer perspective, which is needed to focus on the thematic benefit. Managers have a different perspective still; they focus less on the product or technology itself, and are more preoccupied with the firm's strategic orientation (e.g., focus on generating supply-side synergies). This might also lead to blind spots related to customer themes. Analogously, potential cooperation partners might also simply miss out on customer themes within which the firm's competencies could be combined. Integrating all perspectives, and thus, seeing the full picture, is needed in order to use the full potential of thematic thinking.

### **7.3.2. How to create thematic ideas**

Guidance is needed when aiming at purposefully creating thematic ideas. Thematic thinking can be classified as bounded creativity approach (Hoegl et al., 2008); hence, guidance needs to be given to create ideas. Themes are not very easy to define, but some simple guiding questions can help to generate adequate thematic ideas easily. First, one has to decide the point of departure that should be taken. Themes can be found everywhere, and combining several themes could also be a way to generate a thematic idea. Approaching ideation in this way would turn it into an unbounded approach (Hoegl et al., 2008); therefore, boundaries need to be set. Within the business context, there are three main points of



departure: product/technology, customers, and usage context. All three can be equally useful. Figure 7-4 shows guiding questions for all three.

Points of Departure for Thematic Ideation			
Product / Technology		Customers	Usage Context
Guiding Questions	<ol style="list-style-type: none"> <li>1) What are the products/technologies/services of the company?</li> <li>2) Of which themes are the products/technologies/services part of?</li> <li>3) What are other themes in which the products/technologies/services could be used?</li> <li>4) With which products/technologies/services of other companies do they interact?</li> <li>5) Which elements are part of these themes?</li> </ol>	<ol style="list-style-type: none"> <li>1) Who are the customers of the company?</li> <li>2) Which target group uses similar products but is not yet a customer group?</li> <li>3) What keeps potential customers from using/buying the products?</li> <li>4) Which themes are of importance for the customers?</li> <li>5) Could these themes be combined with existing products/technologies/services?</li> <li>6) Which elements are part of these themes?</li> </ol>	<ol style="list-style-type: none"> <li>1) How are the products/technologies/services used?</li> <li>2) What is the theme of the usage context?</li> <li>3) What are close-by themes?</li> <li>4) What happens before, during, and after the use?</li> <li>5) What are problems related to the products/technologies/services (from buying to disposal)?</li> <li>6) Which elements are part of these themes?</li> </ol>

Figure 7-4: Guiding questions for thematic ideation.

When taking products or technologies of the firm as points of departure, all products, technologies, and services of the company have to be listed first. It is important to list all of them, to avoid a biased pre-selection. For example, what one considers to be the core products of the firm could already be biased, and hence, would be the first chance for biases to be included. The next step is to define all themes of which the products, technologies, or services are a part. Again, it is important not to leave out themes simply because they might seem irrelevant at first sight. Entities can also be considered to be thematically similar if they *could* interact within a scenario or event (Estes et al., 2011). Hence, exploring thematic similarity also means to include options that have not existed thus far, by asking in which themes the products/technologies/services *could* be used. Furthermore, it is important to evaluate the products, services, or technologies of other firms with which one's own interact. This step is especially important to detect the potential for strategic moves, such as building alliances.

The second potential point of departure in generating thematic ideas is the customer. Most of the steps are analogical to the steps described when using products as a starting point. First, it is necessary to define who the customers of the organization are. This definition can be interpreted in different ways. Customer groups can be framed rather broadly and abstractly, or they can be defined in rather small and specific groups. As described in the

section on thematic perspectives, non-customers are relevant for generating thematic ideas within a business context. It is important to define which groups can be identified as those that use similar products or have similar needs as the existing customers, but have not used the firm's products or services thus far. Based on that, barriers that keep non-customers from becoming customers can be identified within the theme. When the target group comprising customers and non-customers is defined, the next step is to define the themes that matter to them, including the themes of which the firm's products are already part. If themes are identified that are highly important to the target group, but the firm's products are not yet part of those themes, a valuable leading thought might be to think of ways they can be combined in a sensible way. Finally, regarding the product approach, the final task is to define the elements that are included in the themes that have been identified as relevant.

The third and final point of departure in developing thematic ideas proposed here is the usage context. While product/technology and customers can be applied in a parallel way to develop thematic ideas, usage context is different. Because usage context can be regarded as being a theme unto itself, this approach is more "narrow" and might easier to apply. However, in some situations, it might not be possible to use the usage context as a starting point, and relying solely on it to derive thematic ideas would be a "too bounded" approach. First, the usage context has to be further defined by exploring how products, services, and technologies are used. This is important, as the way products are used might differ from what is intended by the firm. Then, the theme for the usage context has to be formulated. To open up the solution space for the ideas found, neighboring themes should be identified as well. Next, or parallel to that, what happens before, during, and after usage of the product should be explored. By definition, these elements are part of the theme as well (see Estes et al., 2011). Furthermore, usage-related problems should be identified, as they provide important hints regarding which issues should be addressed by a thematic idea. Here, the full cycle, from purchase decision to disposal, should be taken into account. Finally, all elements that are part of the discovered theme should be listed.

No matter which point of departure has been taken, after having gone through the guiding questions, a description of one or several themes, potentially related problems, and—most importantly—the entities belonging to the theme(s) are at hand. This information that has been gathered can be used as the basis for generating thematic ideas, using the operators (linking, unlinking, exclusion, and inclusion) introduced in Figure 7-2. In the example of the Nike+ Sport Kit, "jogging" is the usage context respective to the theme, within which the

entities “jogging shoe” and “mp3 player” are thematically integrated by the operator “linking” to generate a genuine benefit.

## **7.4. Limitations and future research**

Despite all efforts to draw a comprehensive picture of the nascent concept of thematic thinking in the business context, some questions remain unanswered, and some aspects of the dissertation could be further explored.

### **7.4.1. Longitudinal data as supplement of cross-sectional data**

Data gained in longitudinal study designs could be a valuable supplement to the presented findings. The individual level studies presented in Chapters 3 and 4 use cross-sectional survey and test data, respectively. Although the findings indicate stable aspects of thematic thinking, a longitudinal study would enable important insights into the stability of the construct. It has been shown and argued that the preference for thematic similarity is related to age and education. A longitudinal study could show how, exactly, this preference develops over time, and it could shed more light on the role of education. This would especially be of interest, as the results of the study presented in Chapter 3 failed to support the hypothesized negative relationship between thematic thinking and level of education.

The study in Chapter 6 uses data collected at several points in time (20 trading days); however, this data cannot replace insights that could be gained by longitudinal designs. A longitudinal study, ideally starting before the idea emerges, would be a valuable supplement to studies on the idea level in the fields of innovation ideas and M&A. It would be valuable because it would not only reveal how reactions to thematic ideas develop over a longer time (e.g., long-term market performance), but also, how thematic ideas emerge in the first place. However, these data would be very difficult to obtain in field studies. In addition, as time passes, confounding effects arise, potentially disguising the effects in focus. On the individual level, statistical twins could be used to address these issues by simulating development over time.

### **7.4.2. Measurement of thematic thinking**

In the present dissertation, different methods were applied to measure thematic thinking and its antecedents and outcomes. Pre-studies were conducted to develop these, and the findings of the dissertation provide evidence of the validity of the measures. However,

there is room for improvement, and future research on the measurement of thematic thinking is needed.

The empirical studies presented in Chapters 3 and 4 used a test based on word triads to assess thematic thinking. This method of testing has already been used in cognitive psychology research (Lin & Murphy, 2001; Simmons & Estes, 2008) and has been refined in my pre-studies. One of the strengths of this measure, especially when used together with survey data, is that it is conceptually very distant from other self-assessed measures, such as Likert-type assessments, thereby minimizing common-method bias. However, the source of the measure remains the same. To assess cognitive processes, measurement methods that are not dependent on the individual are hardly workable. In the context of thematic thinking, two options could be chosen to counteract common-source bias. First, instead of trying to assess cognitive processes related to thematic thinking directly, it would be possible to measure their outcomes. For example, independent raters could assess the thematic thinking preference of an individual by evaluating her or his ideas generated in response to a creativity task. Second, instead of using independent assessments of thematic thinking to reduce common source bias, the antecedents or outcomes could be assessed by others. This would be especially valuable to variables already used in the present dissertation as creativity or performance.

Another limitation of the word triad test used in the present dissertation for usage in the business context are the concepts used within the test. The word triads all consist of very simple concepts that cannot be directly related to the business context. In order to apply findings to the business world, using concepts related to it could be a way to improve the measure for future research. Developing such a measure would have some difficulties. As argued and shown above, knowledge of the theme is important to be able to recognize thematic similarity. As such, not using everyday concepts that can be assumed to be understood by all individuals could bias the results. Therefore, when using concepts from the business context, the characteristics of the knowledge of the target sample have to be taken into account, and variables such as expertise have to be controlled for.

#### **7.4.3. Adding and crossing levels of analysis**

In order to complete the picture of thematic thinking, an important step to be taken by future research would be to examine thematic thinking on levels beyond the individual and idea levels, and to add insights on relationships crossing levels of analysis. In the context of R&D, which has been part of the present dissertation, teamwork plays an important role

(Hoegl & Gemuenden, 2001). Further, it has been shown that the interplay of cognitive styles of team members influences team innovation (Miron-Spektor, Erez, & Naveh, 2011). Hence, it would be a promising avenue for future research to examine how thematic ideas evolve in the course of teamwork, whether such a thing as thematic thinking exists on the team level, and how the interplay of different thematic similarity preferences can be put into relation with team-level outcomes.

As mentioned above, thematic thinking can be integrated with the view of organizations as interpretation systems. This perspective focuses on the organization as the level of analysis and suggests that even though individuals' cognitive processes build the basis for organizational interpretations of the environment, the organizational interpretation is more than the sum of its individual level parts, and is mainly based on decisions made by top management (Daft & Weick, 1984). Therefore, examining thematic thinking at the organizational level, particularly in the context of top-management teams, would be a valuable contribution to the development of a full understanding of thematic thinking, and it would help integrate it with existing streams of literature. In existing research, individual characteristics of CEOs have been linked to organizational outcomes (Hambrick & Mason, 1984; Hutzschenreuter & Kleindienst, 2006). As such, an avenue for future research, based on the findings of the present dissertation, could be the examination of the relationship between the inter-individual differences of thematic thinking of CEOs and organizational outcomes. Over the past two decades, an increasing body of research has examined strategic change as a consequence of CEO succession (Hutzschenreuter, Kleindienst, & Greger, 2012). Adding to this stream of literature, future research could examine whether strategic changes can be observed if a CEO with a preference for taxonomic thinking succeeds a CEO with a thematic preference, or vice versa.

#### **7.4.4. Experiments**

One of the strengths and major contributions of the present thesis is that it is mainly based on field data. While it raises external validity, due to the design of the study, conclusions on causal effects cannot be drawn, and internal validity is reduced. Conducting experiments that control for influence factors and use treatment conditions would be a way to supplement the findings of the field data. In the studies on thematic thinking in the field of cognitive psychology, experimental designs conducted in a laboratory setting were mainly applied (e.g. Estes et al., 2012; Golonka & Estes, 2009). However, in these studies, except for

the one by Estes and colleagues (2012), no link was made to the business context. In future experimental studies, there should be a reference to the business world. This could be accomplished by examining antecedents and outcomes that have been shown to be of relevance in the “real world” business context, examining managerial instead of student participants, and providing material that is linked to the business context (e.g., themes, word triads).

The results of the empirical studies indicate that thematic thinking is influenced by situational factors. In experiments, these factors could be controlled or induced. Mood was shown to influence thematic thinking; hence, one setup could examine the mood-thematic thinking relationship by inducing mood, and in doing so, reveal the nature of this relationship in more detail.

#### **7.4.5. Further insights on antecedents and outcomes**

The findings of the present dissertation hint at the assumption that a preference for thematic similarity not only can be regarded as an antecedent of the recognition of thematic relations and thematic ideation, but also influences the evaluations of thematic ideas. Despite having examined thematic thinking as an input as well as an output variable, the empirical link between them is missing in the present dissertation. To complete the picture of thematic thinking, future research will have to provide insights on how exactly a preference for thematic thinking is linked to the generation and evaluation of thematic ideas.

Based on literature related to cognitive differences between East Asians and Westerners (Nisbett et al., 2001; Saalbach & Imai, 2007), scholars have argued that cultural differences should exist for thematic thinking, and they have called for research in this field (Estes et al., 2012; Estes et al., 2011). This argumentation is based on the assumption that the holistic method of processing information, which is associated with East Asian cognition, can be linked to thematic similarity, while the analytic way of processing information, which is associated with Western cultures, is related to taxonomic similarity (Estes et al., 2011).

Despite using data from individuals with different cultural backgrounds (Germany, India), the present thesis does not provide cross-cultural insights into thematic thinking. The two individual level samples have different characteristics, which make it impossible to make valid conclusions regarding cultural differences. The German sample included individuals from a broad range of occupational fields, while the Indian sample focused on R&D professionals. This difference leads to differences in age, gender distribution, work

environment, and education. Furthermore, the differences proposed by thematic thinking scholars are based on findings of studies that focused mainly on Chinese individuals (Estes et al., 2011; Saalbach & Imai, 2007), and Allinson and Hayes (2000) found Indian managers to be even more analytical in regard to cognitive style than Westerners. Hence, future research is needed to shed light on the inter-cultural differences related to thematic thinking.

Another potential influence factor, relating to the situation and not to individual disposition, which has not been examined in the context of thematic thinking so far, are resources. Different types of resources have been discussed, and shown to be related to creativity and innovation (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Hoegl et al., 2008; Weiss, Hoegl, & Gibbert, 2011). Hence, tangible and intangible resources could also be an important influence factor on thematic thinking. Using experiments could be a way to examine this relationship by using experimental conditions under which the availability of resources is manipulated and the output of thematic ideas is measured.

## **7.5. Conclusion**

The present dissertation links thematic similarity to managerial decision making. Conceptual work and several empirical field studies offer impactful insights and help to draw a more comprehensive picture of this nascent concept in the field of management research.

The conceptual work in the thesis demonstrates that thematic thinking can be linked to existing concepts, yet it is distinct, and as a result, it is not redundant. The conceptual model framing thematic similarity as antecedent of complementarity makes it possible to place thematic similarity in the management context and to define thematic thinking. Thematic thinking has been shown to be a multi-layered concept that can be applied on different levels and contexts, which has a significant impact on managerial decision making.

Despite some initial work on thematic similarity in the business context, a comprehensive conceptualization establishing a link between thematic thinking and performance indicators has been missing so far. Importantly, the present thesis empirically shows that thematic thinking is significantly related to some key outcomes of management research; thematicness can be linked to stock market reactions, individual job performance, innovativeness, and evaluation of innovation ideas. All these findings can be taken as evidence of the relevance that thematic similarity has for managerial decision making. They show that thematic thinking in the business context is an undeservedly under-researched and promising field.

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**Affirmation – Statutory Declaration**

**According to § 10 part 1 no. 6 of the Doctoral Studies' Guide Lines  
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I hereby declare, that the

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The following persons helped me gratuitous / non-gratuitous in the indicated way in selecting and evaluating the used materials:

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Gibbert	Michael	Discussion, review, and advice Chapter 5 and 7	gratuitous
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Further persons have not been involved in the preparation of the presented dissertation as regards contents or in substance. In particular, I have not drawn on the non-gratuitous help of placement or advisory services (doctoral counsels / PhD advisors or other persons). Nobody has received direct or indirect monetary benefits for services that are in connection with the contents of the presented dissertation.

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